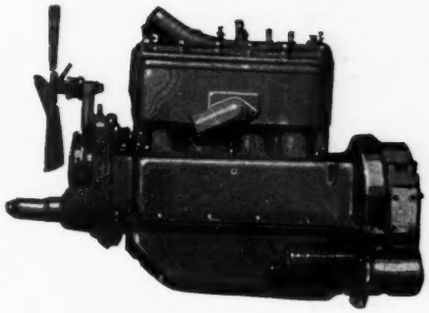
Engineering Library
SEP 6 1921

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XLV
Number 9

PUBLISHED WEEKLY AT 239 WEST 39TH STREET
NEW YORK, SEPTEMBER 1, 1921

Thirty-five cents a copy
Three dollars a year



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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLV. NEW YORK—THURSDAY, SEPTEMBER 1, 1921 No. 9

Public Desires as Related to Design

Last week we discussed the merchandising value of the recent N.A.C.C. attempt to learn what the public wants in an automobile. Here is an engineer's estimate of the survey from the standpoint of design.

By P. M. Heldt

THE relation of the sales manager to the public is definite and obvious. The interest of the engineer in the desires and current opinions of the public, however, is somewhat less direct. In the long run, however, the car which he designs must give satisfaction to the public, so that he can well afford to examine carefully the results of a survey intended to find out what the public wants in an automobile.

The engineer, naturally, approaches the recent N. A. C. C. survey from a different angle than does the sales manager. His reactions to the compiled results are different and the results bear a special significance to the design phases of automotive manufacture. Certain interesting thoughts stand out, however, when the survey is viewed from this angle.

In the first place, it would seem that the questions—which were evidently drawn up with a view to furnishing a guide for advertising managers—were capable of misinterpretation. Take, for instance, the matter of price. Last year nearly one-half of all purchasers bought the cheapest car on the market, which would seem to warrant the conclusion that price is a preponderant consideration in the selection of a car. In fact, it will hardly be disputed that the first thing almost any prospective purchaser decides upon is the approximate price level at which he wants to buy. This price level may be determined by his financial limitations, and in the case of purchasers of low-priced cars it usually is. Even in the opposite sense price is quite an important item. You will find very few millionaires riding around in $1,000 cars; these cars simply don't correspond to their station in life. and so they won't consider them, though in talking about the matter they might not express it in exactly that way. Therefore, when the automobile owners in their replies state that price was given fourth or seventh consideration, they probably mean slight differences in price.

What lingers in the average purchaser's mind as the thing that influenced him most is undoubtedly the thing that finally decided him to prefer the car he actually bought, over one or two others very similar to it in other important respects. That is, most of the variables had already been eliminated when the final choice was made.

From all indications buyers attach the most importance to endurance—by which is probably meant durability. But how can the purchaser judge durability? How could even an expert judge durability? True,

it does not require a high degree of intelligence to predict that almost any car in the $3,000 class will last longer than a car in the $500 class, but this problem does not arise, for, as stated in the foregoing, the purchaser first of all determines the approximate price level at which he wants to purchase, and any comparisons on features other than price would be limited to cars within a comparatively narrow price range.

Durability depends upon a large number of factors, and there is no definite limit to the life of a car. As the car advances in age the expense for repairs and replacement of parts constantly increases, and eventually it becomes excessive, at which time the car should logically be retired. On the other hand, the annual depreciation can be reduced by keeping the car in service for a longer period. The most logical time for retiring the car would seem to be when the repair and replacement expense begins to increase faster than the depreciation expense would be decreased if the car were continued in service longer. This would be true if the service of a car were equally valuable at all periods of its life.

Anybody derives much more satisfaction, however, from a ride in a car that has been out of the dealer's store room for a week than from a ride in one that is going to be scrapped soon.

Nor is the difference wholly of a psychological nature. During the last year of a car's life it has to undergo repairs or has to be tinkered with much more frequently, and therefore is available for service a smaller proportion of the time. Further, the car is no longer as reliable as in its younger years, and the owner can no longer start on a trip with the same assurance of reaching his destination and getting back without trouble as he could when the car was newer. It is for these reasons that cars are usually retired long before the repair and replacement costs have become excessive.

Generally speaking, the things which make for durability in automobile construction, such as liberal bearing surfaces, hardened and ground parts, high grade materials and close tolerances, occasion a good deal of expense to the manufacturer, and it is well understood that they can be expected in a full measure only in the more expensive cars.

The principles of construction employed in any narrow price class are usually so much alike and the durability of the car as a whole depends upon so many separate features that it would be entirely impossible to tell which of two nearly equally priced cars on the salesroom floor would last the longest. Freedom from trouble and satisfactory service, which are generally associated with long life, are brought out in the hands of users, however, and a car that thus shows up well will in the course of time establish a reputation for itself that will be a great help toward future sales.

Engineers should be and actually are constantly on the lookout for any changes in design which would add to the durability of the car without adding materially to the cost. If cost was no object it would be an easy matter to improve any cars of the lower priced class, but, as pointed out at the beginning, price is nearly always an important factor.

In fact, most of the engineering developments of the future in connection with passenger-car design will be with economic ends in view. While we have no doubt that salesmen and publicity writers will continue to tell of the wonderful advances in beauty of lines, in riding comfort and in luxuriousness of appointment—all of which are more or less intangible things—it seems to the writer that the present day high grade car leaves little to be desired from the standpoints of appearance, speed, acceleration, quietness, comfort, durability and dependability. Unfortunately, this type of car is within reach of only a narrow class of purchasers.

Any changes in design which can be made to reduce either the cost of construction or of maintenance will widen the market for the car. An increased market is in itself a great advantage, for it permits of increased scale of production and consequent lower manufacturing costs.

By economy in the questionnaire is undoubtedly meant low running cost (fuel and tires). About the only way the purchaser can form an estimate of these factors is on the basis of the weight of the car. There will, of course, be differences in this respect even between cars of about the same weight and within the same price class, but these are generally so small that there is no means of determining them with any degree of accuracy, and, moreover, such slight differences would have little weight with the purchaser. Fuel consumption and tire consumption are almost entirely independent of the quality construction of the car, except in so far as this affects the weight of the machine. Therefore, to aim at economy in running cost is to aim at light weight, and this is what most designers have been doing persistently in recent years. The results achieved in this direction have been somewhat obscured by the demand for additional equipment.

"MOST of the engineering developments of the future," Mr. Heldt says, "in connection with passenger car design will be with economic ends in view. Any changes in design which can be made to reduce either the cost of construction or maintenance will widen the market for the car."

Appearance probably has more to do with the sale of cars than is generally believed to be the case. It is not meant to convey the idea that the thing which influences the purchaser above all others is appearance, but that, having narrowed the choice down to two or three makes which are satisfactory from the viewpoints of price, size or weight, seating capacity, etc., the final selection among these several cars is made on the basis of their appeal to the purchaser's aesthetic sense. Therefore, the car with an attractive body design has a distinct advantage over competitors. This is fully realized by manufacturers. In fact, appearance is bound to become a constantly stronger factor in determining car sales, as mechanical features are becoming more and more standardized and the service value in competing makes is becoming more equalized.

Service—by which is meant the facilities of the maker to provide repair parts and make repairs promptly—undoubtedly has a considerable influence on resales, while the engineer has nothing directly to do with the establishment of service stations nor with the organization of their personnel and the selection of their equipment, he has an interest in service. The ease with which a car can be serviced depends upon the design, and the engineer is to an extent responsible for the maintenance cost. For instance, if a certain part is very hard to get at and this part happens to be short-lived, it may cost a great deal for labor for replacing it when worn out, and if a car possesses a number of such

features this may prove a great obstacle to resales. The factors affecting cost of servicing a car are so involved, however, that it is practically impossible to judge this item merely from an inspection on the salesroom floor. Evidently what most of the car owners had in mind in answering this question was a convenient, well equipped and well run service station.

It is noteworthy that hill climbing and speed are both classed very low; that is, there is only a small percentage of buyers who make these factors the leading consideration in choosing a car. Almost any car of standard make now satisfies the average purchaser in these respects. Appointments count comparatively low in the scale of factors determining sales and not much attention is paid to specifications.

If any useful conclusion can be drawn from the results of the questionnaire it undoubtedly is that the great majority of purchasers today are serious-minded and are looking for real service from their cars. Above all they want their cars to last. They want them to be fairly economical to operate and they want them to be comfortable and moderate in price. Less emphasis is laid on flexibility, hill climbing ability and speed, a large percentage of all buyers evidently considering the average modern car equal to all reasonable requirements in these respects. From the importance attached to endurance, which figures first in every sectional average and also in two price class averages, it would seem that a great many purchasers believe that the endurance of cars in general is not what it should be.

Results of Argentine Tractor Trials.

THE table published herewith details the results officially announced of the Argentine tractor trials held by the Sociedad Rural Argentino (Argentine Rural Society), near Buenos Aires, in which American machines predominated. They are of interest not only because of the operations and costs shown but also because they illustrate the growing interest in tractor use throughout the export market.

The tractor makers of this country have, in but few cases, gone energetically after export business to Argentina. Many makes which have been successful throughout the United States have not been introduced there and there has been an apparent failure to build up a good volume of business to this growing and rapidly developing country. Yet there is interest in power farming methods in the Argentine, as this table will show, despite the high costs of gasoline and kerosene and the cheapness of horses and labor.

But the need is great. The Argentine is an agricultural country whose chief product is wheat. With this grain, it must compete in the markets of the world with that produced in the United States, in India, in Australia, in Canada and in the other wheat-growing territories. Consequently, there is every reason why the great fertile plains of Central Argentina should be cultivated with the efficiency and economy of the tractor and, no doubt, as manufacturers realize the breadth of this market, they will turn to it with practical and effective educational, sales and service campaigns.

The Buenos Aires trials were held on rather difficult ground for plowing. The announcement of the results says on this score, "The land plowed was hard on the high land and chalky on the low, with an abundance of grass and roots, which made the test somewhat difficult." The fuel costs were very high, considering similar costs in the United States. By converting the cost in Argentine pesos on the normal basis of United States currency and converting from the metric liter to the gallon, we find that the gasoline price was 63½ cents and kerosene 47½ cents. The tractors were required to plow a furrow 8 in. in depth.

Whatever may be the belief of the tractor manufacturers of the worth of such demonstrations in the United States, no doubt can be expressed of its efficacy in such foreign markets as those of Argentina. It is necessary to put the tractor before the agricultural buyers and no better method has yet been worked out for its introduction. The agricultural interests of Argentina are not yet sold on the efficiency and economy of farm tractors; in fact, it is doubtful if the feeling is widespread that the tractor will plow at all.

The energy with which the American manufacturers prove their contentions will determine the volume of sales there. The motorization of the Argentine ranch and farm has started, but little more than a start has been made. Hard work and plenty of educational effort is yet necessary to put over the tractor idea.

TRACTOR TRIAL SOCIEDAD RURAL ARGENTINA—BUENOS AIRES

Make	No. Plows and Size	Area Plowed, Hect.	Fuel Used, Liters	Time	Fuel per Hectare, Liters	Cost per hectare Argentine Pesos	Cost per Hectare Doll'rs	Cost per Acre, Dollars	Remarks
W. D.-80	5 16"	2.4740	98	6hr. 30 min.	39.612	15.84	$6.65	$2.66	Plowed well on high land but gave up on low land.
Case 15/27	3 14"	1.605	2.5 G 42.25 K	5 hr. 25 min.	1.56 G 26.32 K	8.51	3.574	1.43	Plowed well on high and low land
Uncle Sam 20/30	4 14"	1.2696	2.5 G 41 K	5 hr. 27 min.	1. 969 G 32.294 K	10.84	4.54	1.82	Plowed on high land but gave up on low
Case 10/18	2 12"	0.9537	4.6 G 29.5 K	5 hr. 6 min.	4.823 G 30.931 K	11.20	4.704	1.896	Plowed on high and low land
Twin City 12/20	3 14"	1.907	1.6 G 59 K	4 hr. 32 min.	0.839 G 30.937 K	9.62	4.04	1.62	Plowed on high and low land
Cletrac 12/20	3 14"	1.4534	2 G 40 K	4 hr. 48 min.	1.378 G 27.52 K	8.81	3.70	1.58	Plowed on high and low land and used all fuel in its tank
Renault 18/20	3 14"	1.303	43 G	5 hr. 5 min.	33 G	13.20	5.544	2.22	Plowed on high and low land
Oil Pull 12/20	2 14"	1.7087	3 G 45.25 Crude	5 hr. 11 min.	2.78 G 41.940 G	9.50	3.99	1.598	Plowed on high and low land
Monarch 18/30	3 14"	0.857	27 G	5 hr.	31.737 G	12.69	5.329	2.13	Plowed on high land on hill
Fageol 9/19	2 14"	0.7537	44 G	3 hr. 54 min.	58.379 G	23.35	9.76	3.90	Plowed on high and low land

In calculating the dollar costs, the Argentine peso was considered as of its normal value $0.42 gold U. S.
The oil and fuel costs were computed as below:

	Argentine Pesos per Liter	Dollar per Liter	Dollar per Gallon
Gasoline	0.40	$0.1680	$0.635
Kerosene	0.30	0.1260	0.476
Crude	0.26	0.1092	0.40

(One gallon equals 3.78 liters)

Engineering Features of a Popular British Runabout

Eight h.p. air-cooled Rover is properly classed as a cycle car, but it is a well-made chassis which appeals to a large class of British users. It is designed to take the place of the motorcycle with side car, but gives greater riding comfort and the running expense is only a trifle greater.

By M. W. Bourdon

EVER since the commencement of what was known as the cyclecar boom in 1912-13 there have been efforts to popularize light air-cooled engined runabouts in England. But not until a well-known British firm, the Rover Company, Coventry, took up this type did it attain any real popularity. At the present time, there are prospects of other big firms producing two-seaters on similar lines, for while at first they scorned to touch the type, they have become convinced, much against their will, that there already exists a big demand and that there is an immense potential market for low-priced miniature four-wheelers.

The type in question is appealing to quite divergent classes of motor users and prospective users. The "economy wave" and the comparatively high prices asked for four-cylinder water-cooled light cars has resulted in people who in the past have owned much more pretentious cars seeking something still less costly, even if a two cylinder engine be a necessary corollary. Then, the men who have hitherto been users or potential users of the higher powered and high priced sidecar outfits but who have always had a desire for four wheels, greater riding comfort and protection have realized that the type exemplified by the 8 h.p. Rover give those advantages plus practically all that they require in speed and hill-climbing ability at prime and running costs very little greater than the elaborate side-car outfit.

Front view 8-hp. air-cooled Rover

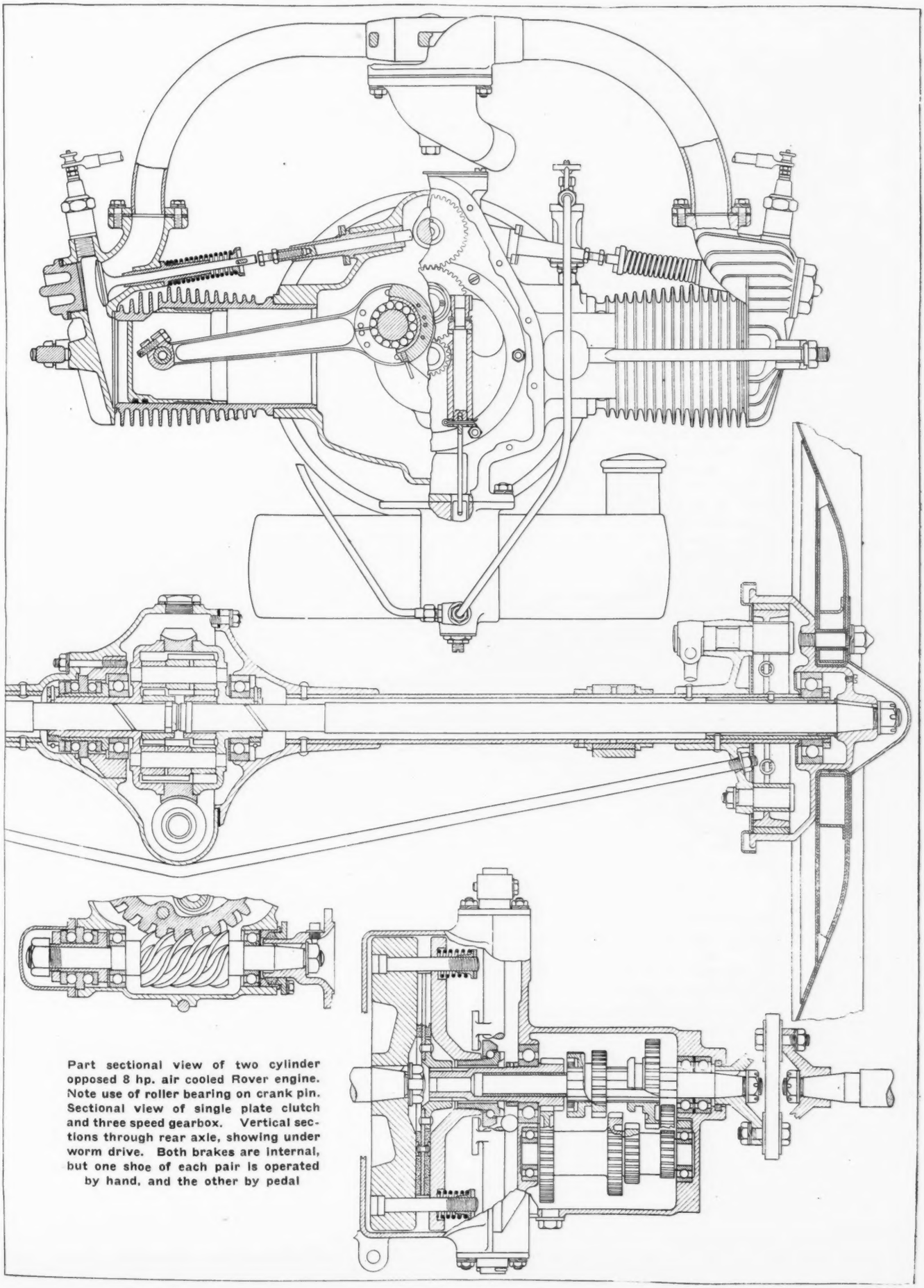
The Rover is unlike several of its prototypes in having a peculiar combination of characteristics. It is not only, as suggested, very little below the 8 h.p. sidecar in performance, being capable of 50 m.p.h. on the level and having a top-gear ability which is quite surprising. It forms also an excellent runabout for those staid and elderly, if somewhat impecunious, owners who desire no speed above 25 m.p.h. or so but demand smoothness of running, good suspension and roominess in a two-seater body. In other words, the little Rover appeals at one and the same time to the youthful "speed merchant" and the elderly "potterer"—as well as to other classes of users.

During this year, the output of this machine has reached and been maintained at 120-140 per week, which for a British plant is distinctly high for any type of car; in fact, it is probably in the neighbourhood of a record for one model.

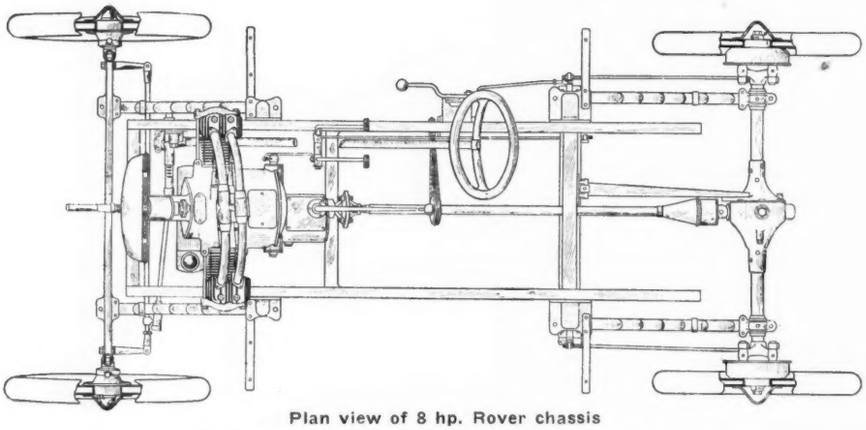
While practically all British cyclecars or air-cooled runabouts have in the past had two cylinder engines, these have been and still are mostly of the V-pattern with cylinders set at 60 deg. But the 8 h.p. Rover has horizontally, opposed cylinders, a feature which, although shared by the A.B.C. and one or two others, is not accompanied as in the latter cases by overhead valves; it has L head cylinders, with a bore and stroke of 85 x 88 m.m. (3 3/8 x 3 7/16 in.; approximately 60 cu. in. capacity). Engine, clutch and three speed and reverse gearset are mounted as a unit, with the crankshaft axis longitudinally arranged.

The crankcase is an aluminum casting carrying the camshaft overhead and having a separate oil sump bolted to it below. The cylinders projecting at each side have detachable heads, each of these and the cylinder barrels being held to the crankcase by two long hinged bolts and a yoke. The valves are somewhat inclined from the horizontal and the exhaust valve in each case is foremost of the pair. Screwed-in valve caps are used with a central radiating projection, sparking plugs being screwed into top of the combustion chambers as these lie in the chassis, this arrangement being obviously adopted to prevent the overall width becoming excessive; but even as it is the hood is fitted with an air scoop at each side and the cylinder heads project to an extent enabling them to be subjected directly to the air draught caused by the movement of the car—for no fan is fitted, the passage of the car through the air being entirely depended upon for cooling.

The two-throw crankshaft runs on ball bearings, a single row at the front and a double row bearing of the radial type at the back. A train of three straight-toothed gears drives the camshaft, a forward extension of which has a flexible coupling for the magneto drive. The intermediate timing wheel bears a worm gear through which is driven a circulating oil pump. The big-ends of the connecting rods have double-row straight roller bearings, the rollers running on the crank pins and within an outer race prevented from moving endwise by washers rivetted to the big-end, these washers also serving to locate the rollers, which, incidentally, are not caged. The wrist pin is locked by a pinch bolt in the small end of the connecting rod and oscillates in the bosses of the cast-iron two-ringed pistons.



Part sectional view of two cylinder opposed 8 hp. air cooled Rover engine. Note use of roller bearing on crank pin. Sectional view of single plate clutch and three speed gearbox. Vertical sections through rear axle, showing under worm drive. Both brakes are internal, but one shoe of each pair is operated by hand, and the other by pedal



Plan view of 8 hp. Rover chassis

Although a bolted-on cylindrical oil reservoir or tank is used, the lubrication system is not of the dry sump type, for a constant level of oil is maintained in the crankcase, only the overflow from this running back into the tank through a filter. The oil pump already referred to is of the sliding vane rotary type. It lifts the oil from the tank to sight drip feeds. From the drip feed exterior pipes convey the oil to the left-hand cylinder and to the timing gear case. The greater part of the oil passes to the latter point and maintains the level in the crankcase, whence splash occurs to the right-hand cylinder, and to a certain extent to that on the left; the latter, however, without a separate feed is liable to be insufficiently lubricated, hence the special lead already mentioned.

A subsidiary oil pipe also runs to the clutch pit to lubricate the ball-thrust collar and pilot bearing, though there is no direct communication between the crankcase and the clutch pit, and except for the subsidiary pipe the oiling systems of clutch and gearset are distinct from that of the engine.

As the illustrations indicate the carbureter is mounted centrally above the crankcase, whence two somewhat lengthy pipes lead to the valve ports. The exhaust leads follow the curvature of the inlet branches and the four are united adjacent to the carbureter flange in order to assist vaporization, the exhaust gases passing back from this point through a single pipe to the muffler.

The clutch is of the single plate type with fabric friction surfaces. Spring pressure is direct from four adjustable springs. There is nothing unusual in the construction of the three-speed gearset, which has ball-bearings throughout, two single-row bearings carrying the rear end of the main shaft. The gear-shift lever is central, and by reason of the forward position of the box the lever is bent back almost to a right angle, where it leaves its spherical bearing. Thus gear shifting consists of movements of the hand which are almost vertical instead of longitudinal, while in "crossing the gate" the lever is moved horizontally in a lateral direction; but no difficulty in driving occurs for this reason once the difference has been appreciated by the driver.

The engine and gearset unit is carried upon two slightly dipped cross members of the straight-sided frame. There are four cross members in all, two carry the power plant, one is below the dummy radiator and the other at the spring anchorage near the rear. The frame is quite a simple structure. It carries extension brackets fore and aft for the four quarter-elliptic springs.

The open propeller shaft has a fabric disk joint at the front end and a sliding pot joint at the rear, the casing of this joint being mounted on the worm shaft of the under-worm final drive.

The back axle has two steel castings for its center, with tubular extension sleeves and a truss rod below. At their rear ends the quarter elliptic springs are bolted up to bearing sleeves on the axle casing, for the springs do not take torque. A pressed steel torque member is bolted above and below to the axle casing and suspended at the front end from the rearmost cross member of the frame. Both sets of brakes are located within the rear wheel drums, but only one pair of shoes is provided in each drum. The pedal operates one segment on each side and the lever the other two segments. Detachable disk wheels with 28 x 3 in. tires are standard.

The front axle is an H-section drop forging with vertical steering pivots. The pins are secured in the axle ends with phosphor bronze bushes about which the forked end of the swivel axles move. The front wheels are carried on adjustable cup-and-cone ball bearings. The steering gear is of the rack and pinion type, which the writer has found from experience is quite satisfactory. The pecuilar steering wheel, built up entirely of steel tubing with only two spokes, and as an integral unit with the column is quite serviceable for such a light car.

The electric equipment provides electric light only from a small generator and battery. Large side lamps and a tail light are fitted, the former having two filaments representing head and side lights. No starter is provided, but an air strangler has a control rod passing forward through the dummy radiator to a point close to the starting crank. The fuel tank is carried within the cowl, fuel being fed to the carbureter by gravity.

The standard equipment consists of a roomy two-seated body with a commodious toolbox behind, single panel hinged windshield and fabric top. The upholstery is in leatherette and the body as a whole, although somewhat roughly made according to British ideas, is comfortable and durable. Five wheels and tires are included in the price, which at the moment of writing is £250 (approximately $1200). The wheelbase is 88 in., track 46 in. and the minimum road clearance 8 in.

It is particularly desirable to emphasize the fact that, apart perhaps from the bodywork, the 8 h.p. Rover is distinctly a good class, almost high-grade, production. There is nothing whatever shoddy about the mechanical features, and except maybe in respect of control rod linkage and such minor details, the 8 h.p. model is quite up to the high quality standard of the 12 h.p. four-cylinder Rover, which is undoubtedly in the first flight of its class. In respect of this matter of quality, many makers of cyclecars and light runabouts have gone wrong in the past. They have endeavored to make a low priced chassis by adopting a low standard of workmanship instead of aiming at a simplified design with higher quality.

THE Metallurgical Institute of the University of Breslau states that the properties of cast iron can be materially altered by an addition of nickel up to a maximum of 1.2 per cent. The transverse strength is then increased by about 30 per cent, the compressive strength in about the same proportion, the tensile strength by about 25 per cent and the hardness by about 18 per cent. The addition is made in the form of electrolytic nickel to the molten pig iron. Amalgamation then proceeeds without difficulty at only 500 deg. Cent. above the melting point of pig iron. The addition of cobalt in place of nickel has no favorable effect.

Motor Bus Successful in Street Railway Use

An American built motor bus has proved economical and efficient for street railway service in San Salvador. The special wheel equipment is described here in detail, while the operating conditions and cost are also discussed. The car is equipped to haul a trailer if desired.

By Donald A. Hampson

SAN SALVADOR is the capital of that Central American republic which is the most densely populated area on this continent. A city of 70,000, it has a street railroad, or "tramway," that serves the public within and extends several miles outside, carrying thence not only suburban dwellers but large numbers of laborers at certain hours of the day. This tramway is of 147 c.m. (57.8 in.) gage and is operated by mule-drawn cars, though a change to electricity was contemplated prior to the war.

The steam roads of the country are all narrow gage. One of them connects the capital with Acajutla, on the Pacific, and to this and the other seaport towns there are good highways, the easiest to reach in this way being La Libertad.

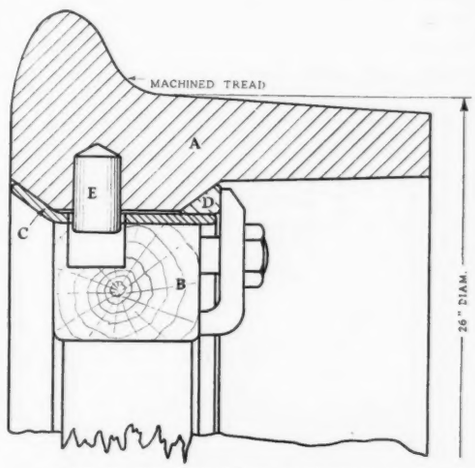
During the early part of 1920 it was decided to try gasoline motive power on the San Salvador tramway. Accordingly, a Daimler and a Reo were purchased for trial. The latter has shown up so well for the work that from ten to twenty more of them are to be put on the line and the mules permanently retired.

The first of these Reos was the standard 1¼-ton chassis as equipped for railroads by J. Blaine Worcester of Middletown, N. Y., and having one of the Paterson Vehicle Co.'s stock 15-passenger bodies mounted upon it. Solid rubber tires were supplied with the car at the insistence of the railway company. These were used in driving the car something less than a hundred miles over the roads from La Libertad to the capital on the interior plateau. As solid tires do not interchange on demountable rims, special wheels were made up for them and mounted in the Reo hubs; these wheels will be used to bring the new cars overland when they arrive.

Some interesting points may be drawn from such an application of motor trucks, using the data on the San Salvador tramway as representing an average where animal power hauling obtains. Tramways, industrial, logging and plantation railroads present physical characteristics peculiar to themselves and to which motor car construction is particularly adapted.

The San Salvador line was originally equipped with American-made horse cars, seating 16, of 15 ft. length over all, and weighing from 3000 to 3500 lb. During the laborers' rush hours 30 are crowded into them. Two mules draw the cars on levels, with two more hitched in front to help over the grades. The speed is never more than 8 or 10 miles an hour at best and is much less on the hills.

Being a street railway, there are numerous sharp curves, some of them having a radius of less than 8 meters (24 ft.). There are grades of varying intensity up to 6 per cent, with a few as steep as 8 per cent and extending for 100 meter stretches. The track is laid with 20-lb. rails on wood ties that are set into concrete foundations. In the city the footway for the animals consists of the street pavement—in the suburbs, it is mostly sand.



Detail of special wheel equipment used on San Salvador street railway motor driven bus

On arrival at San Salvador the rubber-tired wheels were replaced with the original factory wheels equipped for the rails, as shown in the accompanying cut. B is the felloe band and C the regular steel rim. A steel tire A is mounted between the inclines of C and the ring D just as in demountable rubber tire practice. This construction gives a solid bearing around the circumference and a grip sufficient to drive any load. In addition a ⅝-in. pin driven inside the tire is caused to engage a hole in the rim and thus prevents creeping should any loosening of nuts occur. The size of the wheel center, together with a tire thickness designed for ample strength and maximum wear, brings the wheel diameter to 26 in., a decrease which reduces the road speed and increases the tractive effort about 20 per cent. In this instance, the speed is still higher than the maximum desired while the tractive effort with the smaller steel wheels is so high that most of the running can be done on high gear with its resultant economies.

The gasoline car is equipped front and rear with draw heads of the link and pin type so that a trailer can be hauled if desired. The trailers are the lighter cars of the old equipment. The motor car is sufficiently powerful to handle one of these trailers on high gear on the level stretches and over grades on indirect gears, with a full load in both cars, as noted from the following:

Tractive effort with 26-in. wheels—280 lb. on high gear. Tractive effort with 26-in. wheels—1200 lb. on low

gear. Now, assuming that the resistance of the cars is 35 lb. per ton in starting and 10 lb. at 8 miles per hour, we find that a pull of 245 lb. is required in starting, 70 lb. to run at 8 miles an hour and 1190 lb. to climb the 8 per cent grades.

Compare the above with animal haulage. A single horse car loaded as before has a weight of 3 tons, requiring a pull of 105 lb. to start it and 510 lb. to get it over the steepest grades. The average "draw bar pull" of a mule throughout a day's work is 90 to 100 lb., say the latter. It will thus be seen that the **four** mules will be fully loaded to get **one** car over the grades at a **walk**, whereas the motor car takes two cars at 10 miles an hour. Animals possess almost no "speed range," while the motor car, except on hills, can make any speed within reason and safety that may be desired or required.

Another factor resulting in decreased wear and tear is the motor car's flexibility in rounding curves. The horse car with two solid axles must skid half its weight on the rails throughout the length of the curve. For the 8-meter curves at right angle street intersections the difference in length between the inner and the outer rails is over 4 ft! The frictional resistance of skidding the 4-wheel cars of 3-ton weight on sharp curves is found by multiplying the weight on the outer wheels by the coefficient of friction—in this case it is 750 lb. and only by greasing the rails can the mule team successfully haul the car.

The Reo chassis referred to has the usual divided rear axle and equalizing gears, while the cross member that connects the front wheel knuckles is fitted with a "steering lock" that allows the front wheels to turn about the king bolts on curves, but automatically centers them on straight track. Thus such a car can negotiate the sharpest railway curve with a resistance of a thousand pounds less than the rigid axle car—a triumph for automotive engineering.

The Reo car was first run experimentally over the various lines of the company. At the end of the runs it was turned around by running off the rails and turning on the road. A connection handy to the driver enables him to release the steering lock and cramp the wheels for turning. A regular run through San Salvador and to a suburb having been decided upon, turntables costing about $300 in the United States were put down at each end of the run.

Figures as to operating costs in San Salvador are not at hand, but based upon costs in this country for similar service with American labor and adding the shipping charges to the investment, the cost per mile is approximately 20 cents. This includes fuel, labor, repairs, depreciation, overhead and miscellaneous. Assuming a daily mileage of 50 for both the motor car and the mule-drawn car, the former costs $3,650 a year for a seven-day week operation. Compare this with animal costs.

Two mules' feed, harness, shoeing, care, etc., for one year is $730 (365 days). One driver's wages, with extra Sunday pay, is $682. The upkeep of the street or footpath for animals amounts to $365 per team, making a total of $1,777 per year for animal transportation without considering at all the first cost of animals and car. Such figures cannot but have their appeal, not only to horse car lines, but to the various privately owned and operated railroads that are using animal power.

Then there are a number of other items that must be considered in making a fair comparison of animals with motor cars. There is the relief from extra teams required to help over grades, and the possibility (as noted above) of doubling the carrying capacity by a trailer. The motor car makes so much quicker time that fewer cars are required for a given tonnage of freight or a specified number of trips per hour, and this effects a material reduction in the original investment.

The relative economy increases rapidly with the length of the line. While preferable the motor car would not have as great an advantage on a half mile line as on one two miles long. It has been found impractical to haul with animals much over half a dozen miles—with the gasoline car, the limit might be placed at a hundred and return. Roads now operating by animal power must carefully weigh the advantages of the gasoline car with those of electrification.

Progressive and Compartment Dry Kilns

ALL dry kilns now on the market are either progressive or compartment kilns. In the progressive type the drying conditions increase in severity from one end of the kiln to the other, the material being moved into severer conditions as it dries. In the compartment type the same temperature and humidity prevail throughout the kiln at any one time, beginning with mild conditions and increasing in severity as the material becomes dry.

The kiln-drying data and experience of the Forest Products Laboratory indicate that each type has particular advantages on certain points, as follows:

The progressive type of kiln requires less skill in the operator. It consumes less heat per pound of water evaporated from the wood, but the saving of steam possible should not be considered so important as the question of ability to perform the work required with the best results. The progressive kiln reaches its greatest heat efficiency in drying from the green state and is most useful in circumstances which permit of its being supplied continuously with green lumber of one thickness and class. It is, however, impracticable with this type of kiln to give individual attention to special loads of lumber.

The compartment type of kiln is more flexible and affords greater control over the drying conditions, permitting less change in temperature, humidity and circulation in the kiln with variations in the wind and weather. It is better adapted to meet the varying requirements of different kinds of material and is most useful where exact and careful drying is required, as in the handling of refractory woods.

New Process for Marking Tools

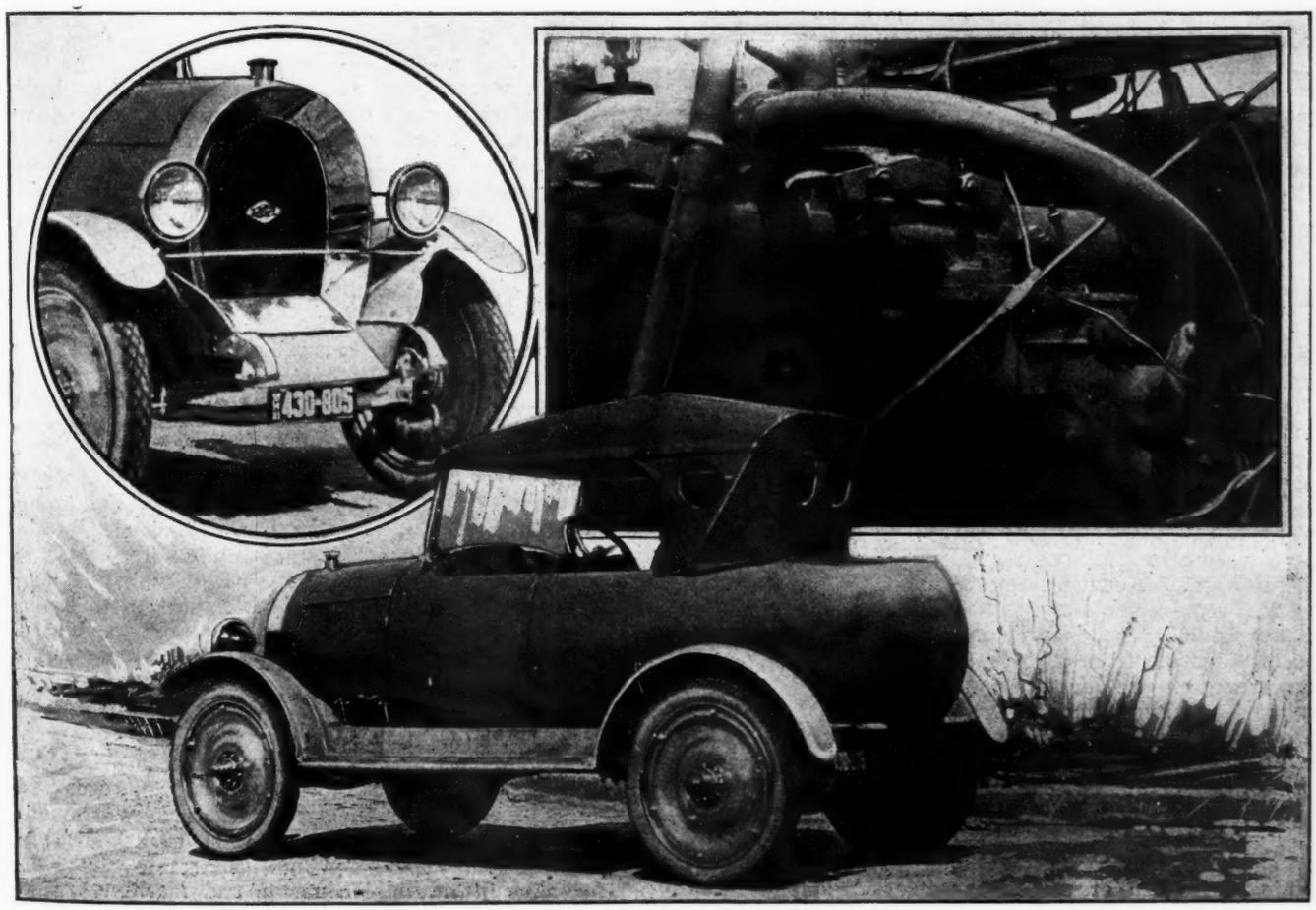
ACCORDING to *Werkstattstechnik*, the surface to be marked, after being finished, is rolled in with a grease paste (similar to printers' ink), sprinkled with asphalt powder and covered with thin paper, whereupon a steel stamp is pressed down upon it. Upon lifting the paper the layer of grease paste comes with it at the points where the steel stamp pressed down upon it. Then the remainder of the grease paste is slightly heated to render it acid-proof; the etching is done by rubbing the surface in with red, fuming nitrosulphuric acid. If the parts must not be heated, they are not sprinkled with asphalt powder, but with resin powder, and the layer becomes acid-proof by exposing it to vapors of alcohol for a short time. This process results in very fine and clear lines.

A Car Especially Designed for Use in Australia

Will be assembled largely from American parts slightly modified to meet tropical climate and adverse road conditions. Provision for high economy in fuel as well as in water important. Much sheet aluminum used.

THE conditions under which automobiles are operated in Australia are somewhat peculiar. Australia is a tropical country, and atmospheric temperatures are normally very high. This, taken in conjunction with the fact that the roads for the most part are in very poor condition and many are nothing but paths through the desert, results in unusual demands on the cooling system. We are informed that the cooling capacity of all imported cars is absolutely inadequate, and it is no uncommon experience for the whole of the cooling water to boil away in a few hours' driving. The situation is aggravated by the fact that water is very scarce in most parts of Australia. Another requirement of the Australian market is high fuel economy, because the price of gasoline is very high.

A car specially designed for these conditions is the Eco, illustrated in accompanying cuts. It was built in Detroit and is now being driven across the Continent by its designer, G. Hamilton-Grapes, who intends to manufacture the machine in Australia. All of the chief mechanical components will be of American manufacture. The model comprises a Turmo engine, Warren clutch and transmission, Peru axles, Zenith carburetor, Philbrin ignition, Bijur starting and lighting system and a U. S. Cartridge Co. radiator core. The wheelbase is 108 in., but this will be increased to 110 in. Three types of bodies will be fitted, a sport runabout like the one shown, a regular four-passenger and a regular five-passenger body. All bodies will be made in Australia from rolled instead of pressed sheets. A peculiarity of the design is the extensive use of aluminum. The fenders, for instance, are of aluminum sheet and are rolled by the same machine as the body plates. The running boards, toe boards and instrument board are of sheet



Views of the Eco car, designed for use in Australia. Note peculiar shape of radiator case which forms a scoop to facilitate greater flow of air through the core. Insert at upper right corner shows the exhaust heated retort employed to assist in vaporizing the fuel

aluminum on wood. This combines lightness with attractive finish and immunity to corroding influences which are especially strong in the hot climate of Australia.

Various changes have been made in the standard components of the model machine. Thus the iron pistons have been replaced by aluminum pistons weighing 13½ oz. each. Each piston is provided with three piston rings at the top and one scraper ring at the bottom, each ring being ⅛ in. wide. With a view to increasing the fuel economy the compression has been made 5 to 1. The reduction on high gear is 4.25 to 1. The flywheel of the engine was cut down in weight from 60 to 40 lb.

The frame members are straight in the vertical plane but are inclined 3 deg. to the axis of the chassis. Half-elliptic springs are fitted in front and cantilever springs at the rear. Both sets of springs are eccentrated, the front springs most. In order to prevent sympathetic vibration of the springs, the leaves of the left-hand front springs are made smooth while those of the right-hand front spring are left rough. At the rear the procedure is reversed, the leaves of the right-hand spring being smoothened and those of the left-hand one left rough. The rear springs, moreover, are set at an angle of 3 deg. to the axis of the car, which is expected to exert a damping action. At the front square section helical supplementary springs will be fitted, so designed that they will close up when there are three or more persons in the car.

The wheels are of the aluminum disk type, the reason for selecting this type being that they help to radiate the heat from the tires.

The radiator has a greater frontal area and greater cooling surface than stock cars of the same horse power, and in addition an air scoop is fitted in front to increase the circulation of air. The splash apron, instead of being arranged vertically as is customary, is placed at an angle to conform to the angle of the air scoop and thus further add to the air circulation.

One of the most interesting features of the car is the special vaporizing means. In this, use is made of a retort within which the temperature is maintained substantially constant by means of a thermostat. The retort may be described as a cylindrical chamber through which the combustible gases is passed on its way to the manifold. The mixture enters the top portion of the retort through a radial inlet and leaves it through a radial outlet. In passing through the retort the mixture current is subjected to a number of sharp bends, which has a tendency to separate out any unvaporized particles, and these collect on the walls of the retort and drain to the bottom of same. The lower part of the retort is surrounded by the exhaust pipe, and the heat transmitted through its wall has the effect of boiling off all the heavy constituents of the fuel that collect at the bottom of the retort. In the upper part of the retort is located a thermostat of the dissimilar metals type which is connected to a butterfly valve in the main exhaust pipe. As the temperature of the retort increases, this valve is opened and some of the exhaust gas is allowed to escape directly without passing through the jacket of the retort. Thus the amount of heat is automatically regulated. The thermostat can be adjusted by means of the star wheel clearly seen in the illustration of the vaporizing system. An extra air inlet is also fitted, which in the model car is operated by means of a pull knob on the dash board but which in the stock car is to be interconnected with the throttle valve in such a way that it will open after the throttle has opened about halfway. Fuel feed is by gravity from a rear tank, with an additional tank in the cowl, which latter can be connected to the carbureter by means of a two-way valve located convenient to the operator, whenever an unusually steep hill makes the feed from the rear tank uncertain.

An economy test of the car was made by two engineers of the Zenith Carburetor Co. A test chassis was used weighing 2050 lb., which with 300 lb. for the two occupants made a total weight of 2350 lb. It was found that the car ran 34.9 miles per U. S. gallon. During the test the average temperature of the mixture at the entrance to the cylinders was 125 deg. Fahr. and the average temperature within the retort, 310 deg. Fahr. A fuel of 58 deg. Baumé was used, of which 90 per cent distilled over below 410 deg. Fahr. The atmospheric temperature during the test was 84 deg. Fahr.

Alcohol Fuel Problem in Britain

THE liquid, or to be precise, the spirit-fuel problem continues clamant for some solution in Britain. The consumption of gasoline is increasing at an accelerated pace largely due to the big fillip given to jitney and other public service coach development from the recent hold up of the railroads and the high cost of rail traveling which is now averaging 75 per cent more than before the war. Last year's total oil production according to very recent figures, was 97 million tons (British), of which 64.8 per cent was American. Beyond this value the fuel requirements of the world are so large that the oil output is only 7 per cent of the existing requirements. Benzole from coke ovens is necessarily dependent largely on the consumption of coal for gas-making and for smelting or metallurgical coke. Therefore it is essential to find another fuel which will assist out of the shortage. Research into the merits and commercial possibilities of alcohol has gone on for a long time in Britain and latterly is one of the items in charge of the Fuel Research Board. So far little of concrete value has emanated concerning it; the only practical and economical evidence of the fuel being the spirit called "Natalite" from South African waste molasses. It is now found that one of the formidable restraining influences to this development is the result of a 60-cent per gallon preference tariff imposed on foreign imported alcohol, i.e. spirit from countries not within the British Dominions. Moreover, it was stated by a deputation to the Minister of Finance (the Chancellor of the Exchequer) this week that alcohol must be allowed in duty free if it is to compete with gasoline. As there can be no progress until, and unless, there is evidence of a dependable supply of alcohol and as such is not, nor seems like being forthcoming from British Dominions, the situation suggests that it is now more important to settle the economic and fiscal problem than those concerned with the chemical and mechanical aspects of power-alcohol. It is a fair instance of how Great Britain stands to suffer by departing from her free trade traditions.

A BILL now before the Spanish Chamber provides for an expenditure of 648,000,000 pesetas on roads and bridges, 493,000,000 for the repair and upkeep of main roads, 157,000,000 for local roads, 900,000,000 for hydraulic works, 60,000,000 for lighthouses, etc., 110,000,000 for agricultural establishments and machinery, and 44,000,000 pesetas in connection with the mining industry.

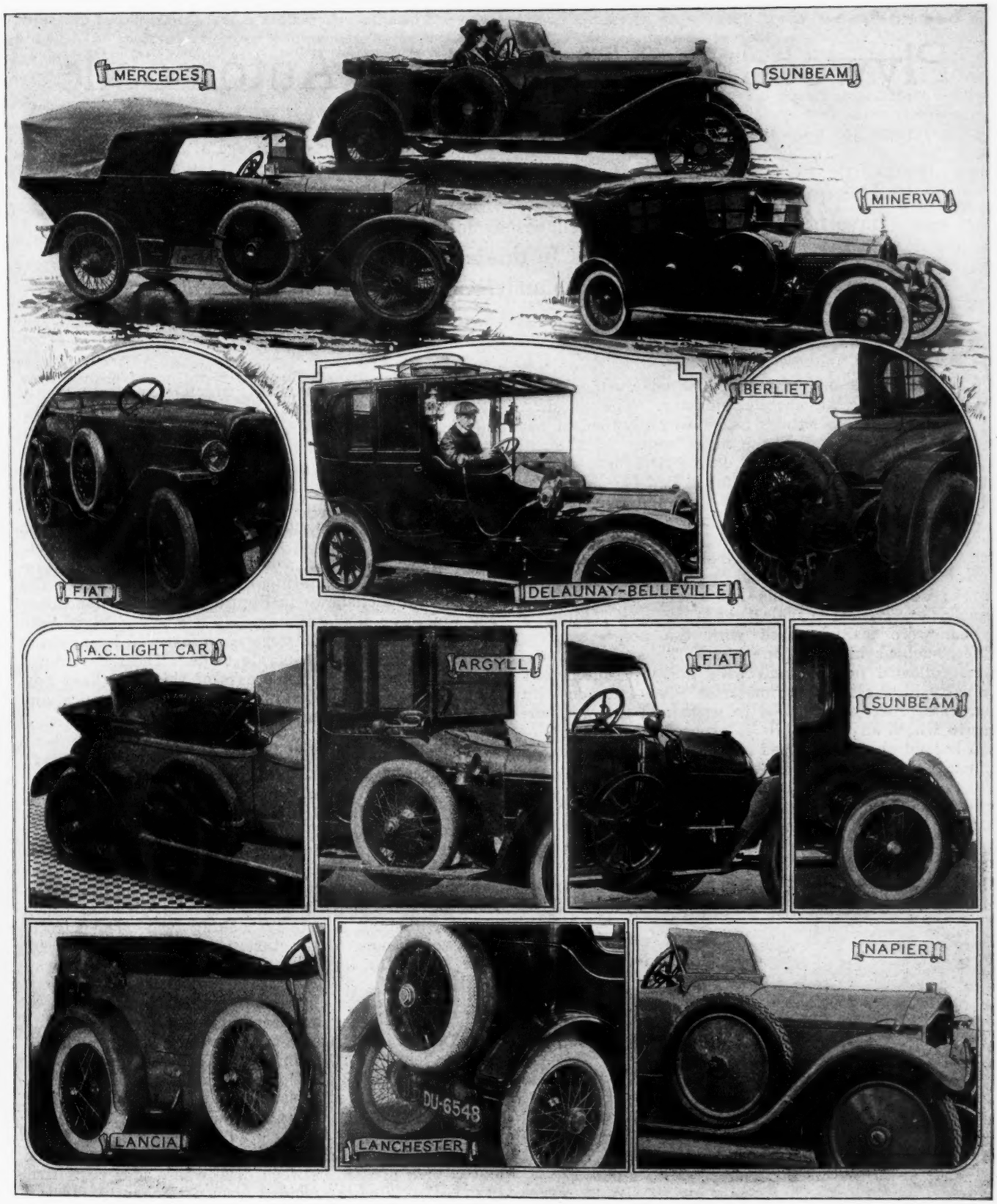
What's the Best Way to Carry Spare Tires?

BETTER methods of carrying tires are being introduced gradually but there is still room for much improvement in many instances as will be seen from a study of the faults and good points in the carriers illustrated in the accompanying cuts. There are advantages and disadvantages in nearly every type so that it is not easy to draw conclusions which will apply in all cases, but certain general observations may prove useful.

First, the carrier should be so placed that it and the spare tire or tires will be in harmony with the body lines and not offend the eye. The bracket should be substantial in appearance and in reality and not give the impression that it was "stuck on" as an afterthought.

Second, the carrier should be accessible and require as little lifting of the tire as possible. It should not have to be held on the bracket with one hand while the fastening device is screwed up or locked with the other. These are important points especially in the case of cars driven by women.

Third, the locking device should be simple and effective, free from rattle and preferably so arranged as not to require a tool to operate, unless operated by the same



wrench used in removing the wheel from the axle or the rim from the wheel. The cylinder lock used on the Wills-St. Claire is covered by a dust and waterproof cap and is an improvement over a padlock.

Fourth, devices which bear against the shoe or the shoe cover are preferably eliminated. Sockets or depressions in which the spare is placed, and in some cases the carrying irons, tend to chafe the casing or its cover. Depressions are apt to hold some moisture which causes deterioration. Straps collect dust and soil the hands.

Fifth, in most cases it is better to attach the support to the chassis than to the body, for such mounting is apt to be more secure and there is less danger of injury to the body frame and panel in case of a rear end collision.

Plywood as Material for Automobile Body Construction

The qualities of plywood as material for automobile body construction have been the subject of much discussion. Certain disadvantages have been frequently pointed out. In this article, the case for plywood is presented by a man in a position to understand the situation thoroughly.

By Armin Elmendorf*

THE manufacture of plywood antedates the beginning of the automobile industry. The question is therefore sometimes asked why plywood is not more extensively used in the manufacture of automobile bodies. It was known during the development period of the motor car body, for it had been used for years in the construction of carriages and other vehicles.

There are at least three reasons why plywood failed to meet the competition of sheet steel for automobile body panelling. The first, and probably the most important reason, lay in the fact that in the early stages of the development of the automobile body plywood panels, or "veneer panels," as they are frequently called, were manufactured with the non-waterproof glues, such as hide or bone glues. Separation of the plies followed in time and with that the automobile industry lost faith in the material. Panels made with non-waterproof glues failed to withstand the weathering to which an automobile is exposed.

A second objection raised against plywood lay in the difficulty of forming it to the curvatures required in automobile body design. Styles in automobile bodies early tended toward severe compound curves. Methods in vogue at that time for the manufacture of plywood in double curvature would not permit the shaping of panels to the severe curvatures demanded.

A third, and probably less apparent reason for the success of steel in competition with plywood lay in the enterprising manner in which manufacturers of sheet steel adapted their product to automobile requirements. They met the special problems of body construction by concerted efforts and technical service, while manufacturers of plywood knew little about the mechanical properties of their product and were not in position to give technical co-operation.

It is significant to note, however, that even though plywood carriage bodies were originally made with non-water resistant glues, when properly made and protected by thorough painting, they gave good service. The Edison Electric, shown in Figure 1, has a plywood body made of three plies, totaling 5/16-inches and glued with hide glue. The panels were manufactured by pressing them between heavy concrete cauls. Their curvatures are, however, slight. Some cars of this kind have now seen more than ten years of continuous service and show no signs of deterioration in the panelling.

*Consulting Engineer Haskelite Manufacturing Corporation.

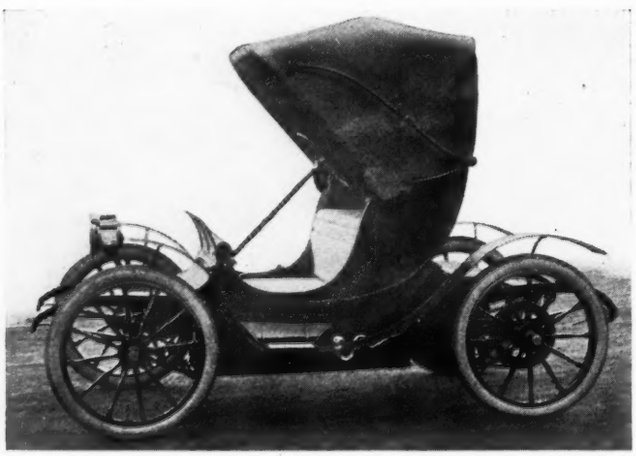


Fig. 1—Old Edison electric, body panels made of 3-ply plywood. Cars like this have been driven for more than ten years without deterioration of the body panels

Waterproof Glue Development

The present interest in the use of plywood for automobile bodies is a result primarily of the perfection of highly water-resistant glues during the war. Airplane requirements called for plywood which would withstand considerable weathering and which could be soaked or boiled in water without separation of the plies. Glue formulas were perfected which enabled the Navy and Army airplane departments to specify plywood which would withstand a ten-day soaking test. The success with which some manufacturers met these requirements later led to the investigation of plywood for other industrial uses.

Early in the war a process for manufacturing canoes out of 3-ply plywood had been perfected by the Haskelite Manufacturing Corporation. Plywood panels which had been softened by steaming or boiling were pressed between heated dies and allowed to dry in the pressed condition. This process was adapted to the manufacture of fuselages during the war and a modication is now used for making roofs of closed passenger cars. When plywood has been steamed or soaked in boiling water and is then pressed between dies, where it is permitted to dry, it retains the molded form permanently. In the operation of molding, the fibers in various parts of the panel are upset similar to the upsetting of the wood fibers in a chair rocker or in a wood felloe of a wagon wheel. It is well known that the back or the rockers of a chair do not change their form with changing moisture content of the wood. The same is true of plywood when made in the manner described.

The perfection of waterproof glue removed the first

objection to plywood for automobile bodies, and the new process for molding removed the second objection to a large extent.

Increased Technical Knowledge

That the third objection mentioned as formerly militating against the use of plywood for automobile bodies does no longer hold to the same extent as formerly, is evidenced by the number of plywood bodies that have been built in the last two or three years. Manufacturers are beginning to understand the properties of plywood and with increased knowledge of its properties comes confidence. While the physical and mechanical properties of steel and aluminum have been known for years with considerable accuracy, the corresponding properties of plywood were not known until they were investigated during the war by the United States Forest Products Laboratory and by a few private research laboratories. As the result of the information obtained in the research laboratories of these institutions, and also as a result of the improvement in methods of manufacture, the following advantages of plywood over sheet metal are now apparent:

1. Plywood panels eliminate the forming of the body panels by the body manufacturer.—This, of course, greatly reduces the cost of equipment of a body factory. It not only eliminates considerable factory equipment, but it also reduces the amount of floor space necessary for the production of a given number of bodies. Manufacturers of plywood body panels furnish them molded to the correct curvature and size, so that they are ready to be applied to the body frame.

2. The strength of plywood per unit of weight is greater than that of sheet steel or aluminum. By dividing the average tensile strength of 3-ply gum plywood, both parallel and across the face grain, by its specific gravity, a tensile strength of 10,800 pounds per square inch per unit of weight is obtained. The same figure for rolled aluminum is 7,200, and for mild steel, 7,650. The substantial superiority in the tensile strength per unit of weight of 3-ply plywood is apparent from these figures.

3. The plywood body weighs less than the steel or aluminum body. Two thicknesses of plywood are used in body construction—the ¼-inch 3-ply stock being for light bodies, and the 5/16-inch stock for medium weight bodies. Corresponding to these we have No. 22 and No. 20 steel; and No. 16 and No. 14 aluminum, respectively. The following table shows the decided saving in weight effected by the plywood body:

Weight per square foot
Light weight bodies, 22 ga. steel 1.27 lbs., 16 ga. alum. 0.87 lbs., ¼-inch Haskelite (Plywood) 0.73 lbs.
Medium weight bodies, 20 ga. steel 1.50 lbs., 14 ga. alum. 1.09 lbs., 5/16-inch Haskelite (Plywood) 0.89 lbs.

4. Plywood reduces the weight of the body frame. While sheet steel or aluminum function only as a covering, plywood serves both as a covering and as part of the body structure. Metal panels are, as it were, merely a dress and contribute very little to the body strength, while plywood panels contribute materially to the strength. The principal stresses to which an automobile body is subjected while in motion result from the twisting or racking of the car. A simple analogy will make clear the superiority of plywood in contributing to the rigidity of the body. It is only necessary to compare two open boxes, one made of plywood and the other of sheet steel of the same weight. It will be assumed that satisfactory corner members are used in each case to give good strength in the corners. By twisting two boxes of this kind, the one made of plywood and the other of steel, it will be seen that the plywood box is very much more rigid than the steel box. Body designers, in fact, disregard the stiffening imparted by the sheet metal paneling. In the case of plywood, however, the contribution to the rigidity of the body is so great that the designer can take advantage of it by reducing dimensions of some members of the framing, and thereby reducing the weight of the body framing.

5. Plywood deadens sound. By striking two sheet metal panels freely supported, one of steel and the other of aluminum, it will be seen that the steel panel gives out a harsher and more ringing sound. The difference that exists between sheet steel and sheet aluminum in respect to sound exists in a still more marked degree between aluminum and plywood. By striking a plywood panel similarly supported, it will be seen that plywood resounds with the dull sound of wood.

The metallic clang of sheet steel is particularly noticeable in an automobile when slamming a door. The absence of the metallic sound when closing a plywood automobile door is one of its most striking characteristics. The same property of deadening sound vibrations contributes in general to the dignity and quietness of the whole body. Vibrations due to rough roads are damped out.

6. Plywood has superior insulating value against winter weather. There are various ways in which the heat in the interior of a closed body coming from the engine, exhaust, heater, etc., escapes from the body. Some of it passes out due to convection through door and window crevices. The rest of it is conducted away directly through the window panes, the roof, and the body sides. Steel is a good conductor of heat, so that the heat in the interior of the car is rapidly carried through the metal to the cold air outside. Plywood, on the other hand, has pronounced value as a heat insulator. For every heat unit, which is conducted through plywood, the sheet steel of the same weight conducts about 2,000 heat units out of the body.

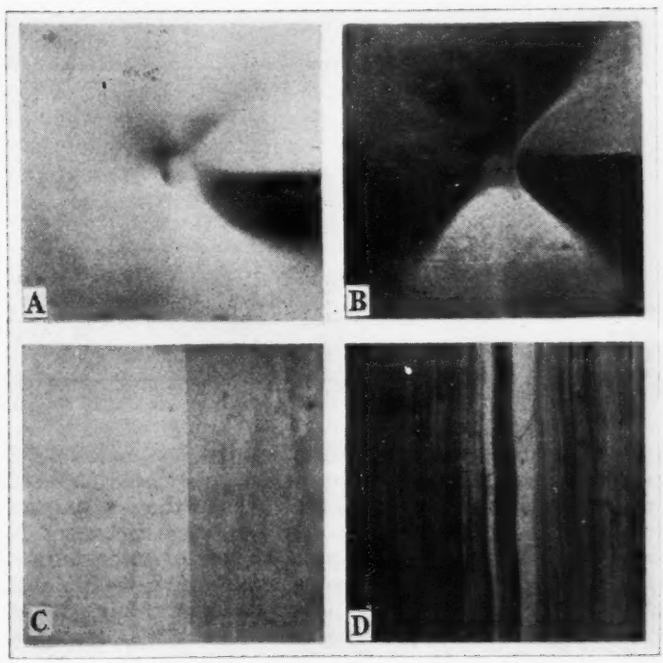


Fig. 2—Results of impact tests on steel, aluminum, and plywood panels, all of about the same weight and subjected to the same blow. A, aluminum; B, steel; C and D, Haskelite (plywood). The markings on the plywood panels are the figures in the wood. The steel and aluminum panels are badly dented, while the plywood panels remained flat

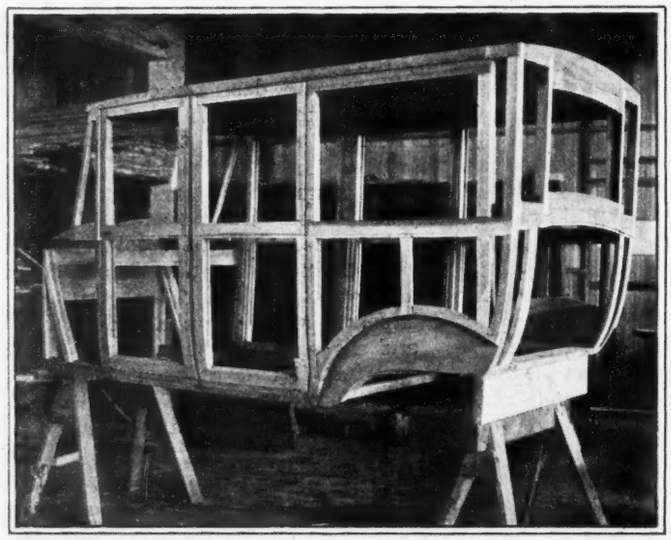


Fig. 3—Assembled frame for plywood sedan body.

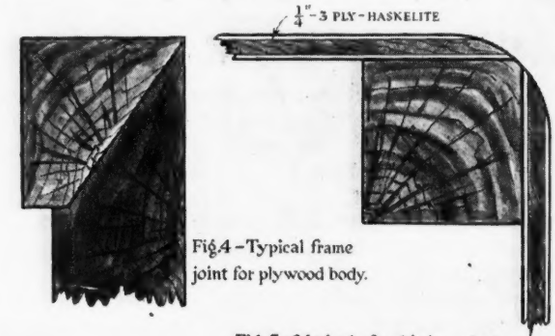


Fig. 4—Typical frame joint for plywood body.

Fig. 5—Method of making rear body corners.

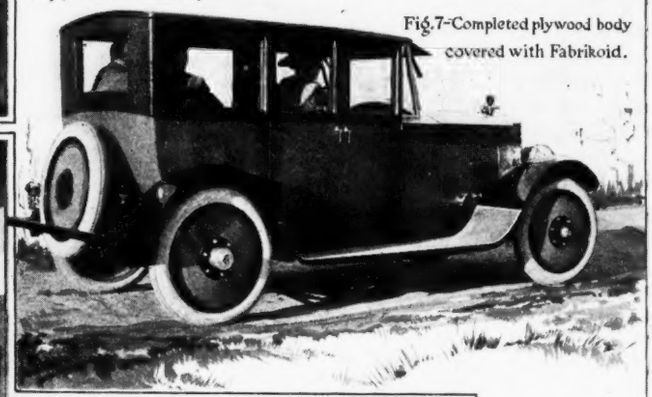


Fig. 7—Completed plywood body covered with Fabrikoid.

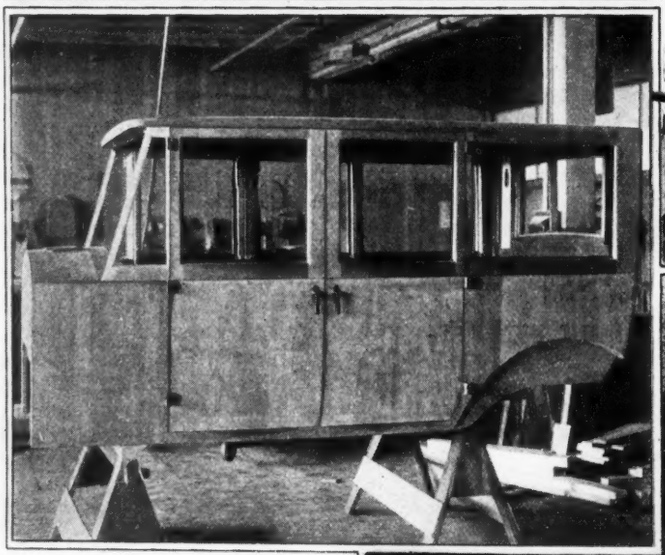


Fig. 6—Body with 1/4 inch plywood panels attached to frame. Weight 485 pounds.

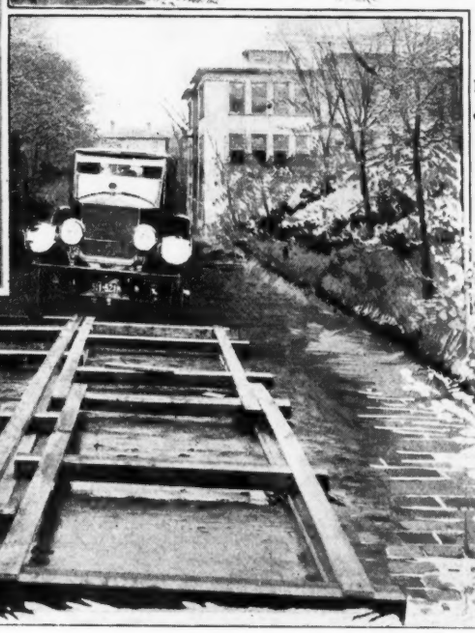


Fig. 8—Test track over which car was driven several hundred times at speeds ranging from 20 to 30 m.p.h.

7. Plywood is much stiffer than sheet metal. By pressing against the surface of a metal door, the sheet metal deflects a certain distance, depending upon the magnitude of the pressure. If the same pressure is brought to bear upon body panels made of steel, aluminum, and plywood, respectively, all of the same weight, it will be found that the plywood deflects only about one-thirteenth as far as the aluminum, and about one one-hundredth as far as the sheet steel.

8. Plywood is more resistant to blows. When a panel of any material is struck, the amount of energy it will absorb and still spring back to its original position without suffering a permanent dent, is spoken of as its elastic energy. It corresponds to the energy in a spring absorbed upon applying a sudden pressure to the spring. Upon removing the pressure the spring returns to its original position. In the case of metal panels, as well as for plywood, there is a certain deflection which if exceeded will cause the panel to receive a permanent dent. Under such conditions the elastic energy has been exceeded. Extensive tests have been made to compare metals and plywood in this respect, and it was found that the energy which will cause a plywood panel to receive a permanent dent is usually seven or eight times as great as the blow which will seriously dent sheet steel or aluminum. This means, of course, that many blows which will dent a metal body would not cause a depression in the plywood body. The energy

which will cause actual rupture of plywood has been found at times to be fifty times as great as that which will dent a sheet steel body so badly that it has to be repaired. Fig. 2 shows the effect of blows of the same magnitude upon steel, aluminum, and Haskelite (plywood) panels of about the same weight.

9. Repairing. When a sheet metal body is badly dented by striking an obstruction, the upholstering has to be removed and the dent hammered out. The success with which the damage is concealed depends largely upon the skill of the mechanic upon the job. In the case of plywood, which will only rupture under a much more severe accident, the particular panel in which the fracture occurred is simply removed bodily from the side. It is then replaced by a new panel of the same kind and size.

10. Finishing. Users of plywood for body purposes prefer either one of two methods of finishing. The first calls for covering the body with a muslin cemented on to the wood. The muslin is subsequently primed and filled with putty glaze or "rough stuff," and is then enameled according to standard procedure. The second method consists in applying some type of artificial leather, such as Fabrikoid, to the surface. Such materials are glued on and require no further finishing. They have the advantage over the paint shop finishes in that they greatly reduce factory floor space. It is estimated that the amount of floor space necessary for finishing is reduced to one-twentieth the paint shop space and drying rooms. Such materials are particularly applicable to the plywood body because they are easily glued onto wood.

11. Cost. While aluminum is comparable to plywood in some of its properties, it costs about twice as much. A complete set of plywood panels, molded and ready to be applied to the body frame, costs about the same as a set of steel panels ready to be applied. The fact that the cost of plywood compares so favorably with that of steel will no doubt in the future contribute to its more extensive use.

One of the most successful designs of a plywood body recently developed is that worked out by the Wright-Fisher Engineering Company of Detroit, for the Birmingham Motors Corporation of Jamestown, New York. The body frame is shown in Fig. 3. Several features are worthy of note in the construction of this frame. The reduced thickness of the sills should be noted in particular. The wheel housing is of 3-ply Haskelite made with waterproof glue. All horizontal wood members of this frame are of poplar, and the vertical members as well as the sills are of ash. The roof rail is of poplar and the bows are of ash.

The method of framing the horizontal and vertical members is shown in Fig. 4. The two members were glued and screwed together. The method of making the rear corners is shown in Fig. 5. The plywood panels were first glued by clamping to the corner posts, and after the glue had hardened the corners were rounded as shown. A joint of this type overcomes an objection sometimes urged against plywood for body purposes in that it removes the blunt end of the panel and substitutes for it a feather edge. In this way the stresses at the end of the panel set in by any racking motion of the body are very small. Experience in the construction of carriages showed that this was the best type of joint to prevent joint openings.

The body with the panels fastened on is shown in Fig. 6. The panels were glued along the edges to the frame and clamps were applied at frequent intervals, holding the plywood to the frame until the glue had set. The operation of screwing and unscrewing the clamps requires little time and compares very favorably with the time of applying metal panels to the frame.

The weight of the body, as shown in Fig. 6, is 485 pounds. This includes the hardware, fittings, cowl, etc. All body panels are ¼-inch 3-ply poplar Haskelite.

The body is mounted on to the chassis frame with three bolts on each side in the conventional manner.

The completed car is shown in Fig. 7. It weighs 3,000 pounds as the manufacturer delivers it, without accessories but with front and rear bumpers. The car has a wheel base of 124 in.

As evidence of the great rigidity and strength of the body to withstand the racking motion of rough roads, the test track shown in Fig. 8 was laid and the car was driven over it no less than 500 times at speeds ranging from twenty to thirty-five miles per hour. The body did not suffer even under such a very severe test.

Casein Glues Exceptionally Durable in Damp Places

CASEIN glues are as a class more water-resistant than animal and vegetable glues, but they are not, strictly speaking, waterproof. There is no glue that is waterproof in the sense that it is absolutely unaffected by water after a long immersion. Nevertheless, there are casein glues that are so water-resistant that plywood glued with them will withstand soaking for many weeks in water or exposure for many months to a warm, damp atmosphere. Under similar conditions, animal and vegetable glues would lose their strength in a short time.

When casein glue joints are kept fairly dry, they can be expected to retain their strength and remain unchanged for an indefinite period, as is the case with animal and vegetable glues. Water-resistant casein glue in a joint, kept constantly wet, will, after a long time, weaken, but it will ordinarily regain a great deal of its strength if the joint is dried. In a study aimed to discover the reason why casein glues ultimately decompose when kept moist, the Forest Products Laboratory found that under certain conditions the decomposition seemed to be due to a hydrolysis of the casein, undoubtedly brought about by the sodium hydroxide that is always present in casein glues.

This explanation when published recently was misunderstood to some extent. It should not be taken to mean that casein glues are unreliable, and not durable enough for use in manufacturing plywood and other glued products. On the contrary, casein glues are considered as permanent as any under dry conditions, and the water-resistant casein glues are more permanent than animal or vegetable glues under wet or damp conditions.

PENCIL drawings are light grey and easily erased; for many purposes, as, for example, reproduction drawings, workshop drawings, etc., it would be desirable to convert pencil lines into dark black lines adhering firmly to the paper. According to the patented process of Doctor Gruner this can be easily accomplished by laying the drawing side of the pencil drawing on a clean zinc plate and rolling over the back side with a metal roller. The zinc plate is connected to the positive pole, and the metal roller to the negative pole of a direct-current house circuit. The current detaches some zinc from the zinc plate and this zinc is deposited in a finely spread form on the graphite of the pencil lines, adhering closely to the fibers of the paper.

High Altitude Aircraft of the Future

The possibility of keeping engine output constant at high altitudes is discussed in this article, together with the relation of this factor to various types of flying. The writer compares the probable function of the airplane and dirigible. The article was translated from *Der Motorwagen*.

By Professor C. Eberhardt

THE output of an ordinary gasoline engine decreases with increasing altitude substantially in proportion to the density of the atmosphere. The result of this is that flying speeds decrease materially at higher altitudes. Curve v_x in Fig. 1 shows this decrease in flying speed. It will be seen that the plane on which this diagram is based has a flying speed of 93.2 m.p.h. close to the ground. With increasing altitude the speed increases at first and attains its maximum value of 94 m.p.h. at an altitude of 2500 ft. However, up to an altitude of 6000 ft. there is no appreciable speed variation. But beyond 6000 ft. the speed decreases rapidly; at the maximum altitude which the machine is able to attain, the "ceiling", it is only 75 m.p.h.

If the airplane on which this diagram is based serves for commercial purposes there is no object in seeking to attain a greater altitude than 6000 ft. The machine flies most rapidly and most economically at about 2,000 ft.

The conditions are entirely different if the output of the gasoline engine is maintained constant for changing altitude. This is now possible within certain limits, up to between 16,000 and 20,000 ft., by providing the engine with an air compressor which supplies it with the air necessary for the complete combustion of the gasoline vapor at all altitudes. At an altitude of 20,000 ft. the air pressure is equal to only about ½ atmosphere. In order that at this altitude the engine may draw in the same weight of air as at ground level it is necessary to precompress the air to 1 atmosphere.

This, however, does not suffice to ensure the desired result. There is also required a propeller with variable pitch, as a non-adjustable propeller is incapable of absorbing the whole output of the engine in the tenuous medium. The engine would race. Such propellers were under development in Germany toward the end of the war, by Prof. Reissner, the Lorenzen propeller firm, A. Boerner and others, but the experimental work on them was not completed.

Adjustment for a steeper pitch with increasing altitude is then accomplished either manually or automatically, through the intermediary of the declining pressure of the outer atmosphere. Under these conditions we obtain for the same machine as that previously considered, the flying speeds plotted in Curve V'x, Fig. 1. It will be observed that there is a continual increase in speed with increasing altitude nearly up to the ceiling. With constant engine output the ceiling is exactly three times as high as that in the first case, in which the engine output decreased normally.

If it were possible to keep the engine output constant up to this altitude, the maximum flying speed at 50,000 ft. altitude would be 143 m.p.h. instead of 94 m.p.h. as in the first case.

It will be seen, however, that even within the altitude limits within which it is possible to keep the engine output constant, about 20,000 ft., there is a material gain in speed. While, therefore, it would be useless in the first case to ascend to a higher altitude than 6,000 ft., the object now is to fly the main part of the trip as high as possible, for the speed curve v'_x shows the maximum speed to be reached at an altitude close to the ceiling, while the curve v_x shows it to be attained near ground level.

The materially reduced air resistance at high altitudes, in conjunction with the constant engine output, as well as its complete absorption by the propeller, are the causes of the considerable increase in speed. It is presumably the same mechanical reasons which induce all migratory birds in their migrations to fly at considerable altitudes. Even the comparatively low-flying curlew has been observed to fly at an altitude of 16,000 ft. But it is believed to be very likely that many migratory birds fly at the surprising heights of 30,000 to 40,000 ft.

It is to be assumed that the characteristic five pairs of air bags within the bodies of birds serve the purpose of supplying the air required by the animal engine in order to keep its output of muscular power constant at

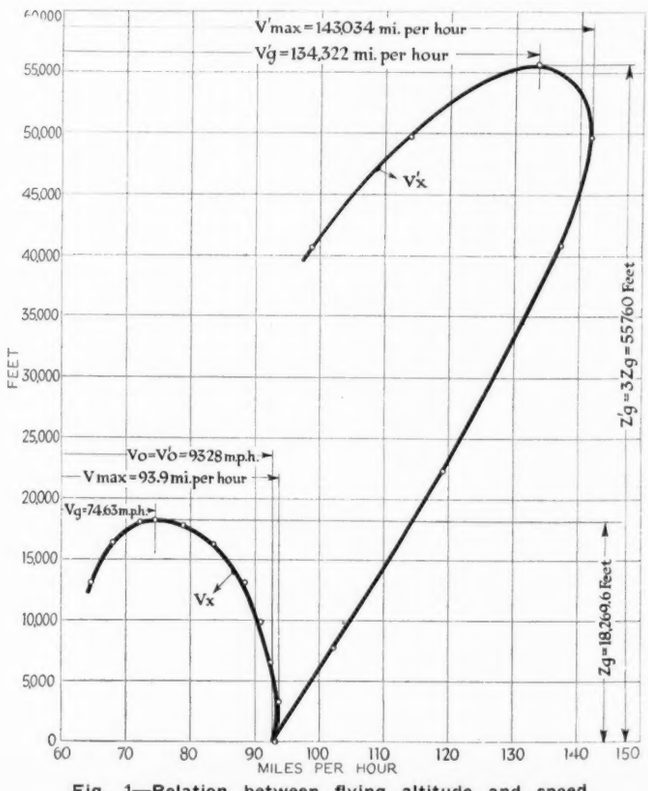
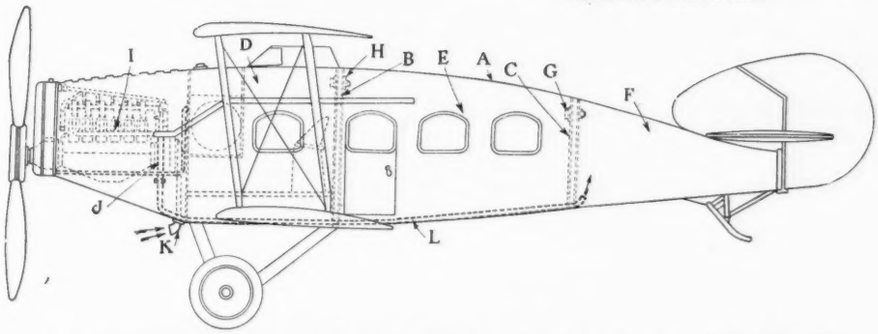


Fig. 1—Relation between flying altitude and speed under various conditions



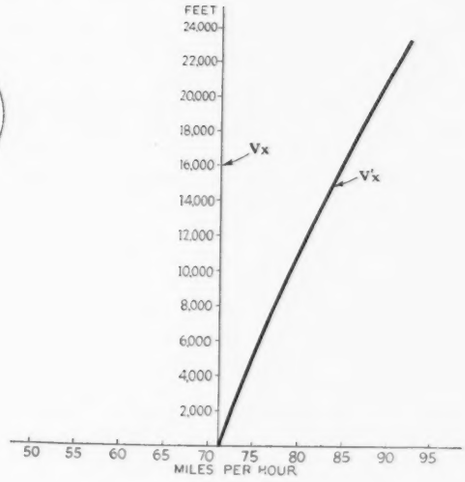


Fig. 2—Airplane with closed cabin in which constant air pressure is maintained at all altitudes. Fig. 3—At right, relation between altitude and speed of a dirigible

high altitudes, thus increasing the flying speed. This is undoubtedly the object of flying at such high altitudes, where the air pressure is barely one third atmosphere and the temperature as low as minus 58 deg. F.—a temperature which the migratory bird, protected by its warm feather coat, can withstand without difficulty, especially when it is considered that it is doing continuous intensive muscular work.

As regards altitude flights by airplane we would have to consider for the present altitudes of 20,000 ft., at which the air pressure is about one-half atmosphere and the temperature from minus 4 to minus 22 deg. F. An extended trip at such altitudes therefore is possible only if an airtight cabin is provided for the pilot and passengers, within which the temperature and pressure are maintained normal. Continuous replenishment of the air required for breathing is another requirement.

The technical solution of this problem is essential to the production of the altitude flying machine. According to a plan of Boerner, this problem is solved in a simple manner as follows: The air pumped by the compressors, instead of being fed directly to the engines, as has been the custom heretofore, is forced into an air-tight space at the rear of the fuselage which serves as an air reservoir. From there the air, which is compressed to about one atmosphere and considerably raised in temperature, passes through a reducing valve into the main cabin, so that the passengers are constantly supplied with fresh air at constant pressure and a temperature of about 68 deg. F. Through a second reducing valve the air then passes into the engine space and pilot's enclosure, from where it is drawn into the engine.

The accompanying drawing, Fig. 2, is a side elevation of a flying machine within the cabin of which a constant air pressure can be maintained in the manner described. The fuselage A which is intended to be made absolutely airtight, and with all moving parts extending to the outside passing through stuffing boxes, is divided by two air-tight partitions B, C, into three compartments, D, E, F. Compartment D contains the engine I and also serves as the pilot's and mechanic's compartment. Compartment E is the passenger cabin, while compartment F serves as a reservoir for the compressed air. In partition C there is a reducing valve G, in the partition B a reducing valve H. Upon the crankshaft of the engine is mounted a centrifugal air compressor J whose suction line ends in a trumpet-shaped mouth piece K outside the fuselage.

For a 2000 hp. plane there would be required from 60 to 70 cu. ft. of air per second, which would have to be supplied by the compressor. For an altitude of 16,000 to 20,000 ft., at which the air pressure is only about one-half atmosphere, assuming adiabatic compression, there will be a temperature rise of 83 deg. F., and if we assume the outside temperature to be minus 15 deg., the temperature within the fuselage will be 8 deg. The compressor capacity for this altitude figures out to 190 to 220 hp.

From these figures it will be seen that there is nothing in the way of a practical realization of the Boerner conception. No trouble need be anticipated from the excess pressure of one half atmosphere within the fuselage, as regards rigidity, weight and airtightness of the walls. As the problem of maintaining the power output of the engines constant and that of the ability of the propellers to absorb this power at all altitudes may be regarded as solved, there are now no longer any fundamental difficulties in the way of a realization of the altitude airplane.

The importance of the high altitude airplane for the future is to be judged on the ground that it probably will be called upon to open up transatlantic routes through the air—a field which at present seems to be reserved for the dirigible, on account of its greater load capacity at equal speed. Owing to its higher flying speeds, the high altitude airplane offers the possibility of crossing the ocean with a limited yet commercially practical useful load, even though regular transatlantic air traffic will always remain the chief problem of the dirigible. On the other hand, the chief problem of the giant airplane, commercial traffic over prepared continental routes, in stages of suitable length, would be materially facilitated by the use of altitude airplanes, and the economy of the service would be greatly improved by increasing the length of the stages from 600 to 1200 miles.

It is true that a dirigible also gains by the use of engines with supercharger and adjustable pitch propellers. But with the use of ordinary engines, without supercharger, the speed remains constant at all altitudes, in contrast to the airplane, as the air resistance decreases with increasing altitude in the same measure as the engine output, and therefore as the propeller thrust.

Fig. 3 shows the variation of the speed of a dirigible with altitude up to 23,000 ft. In the case of decreasing engine output we obtain for the v_x curve a straight line parallel to the y axis, that is, a constant speed. In the case of constant engine output the increase in speed with the altitude may be seen from the curve v'_x. The speeds are given in miles per hour.

But for dirigibles the use of supercharging engines is not of nearly the same fundamental importance as for airplanes; mainly because flights at high altitudes are rendered commercially impracticable by reason of the reduced load carrying capacity. The gain due to the increased speed at altitudes is entirely out of proportion to the loss due to the reduced bouyancy and the corresponding loss in load carrying capacity. But the large load factor, which in the case of large dirigibles amounts to as much as 60 per cent, determines the superiority of

the dirigible over the airplane for certain purposes and insures to it for the present the absolute supremacy on transatlantic routes.

The development of the altitude airplane may, however, change the situation in that the dirigible will no longer be without competition on transatlantic air routes.

The chief problem of the dirigible and the giant airplane were outlined above. These will hardly be materially changed in the future. It is evident, however, that the limits of these two, physically so widely different, types of aircraft cannot be drawn with any degree of accuracy. The determining factor is always the economy of the service, which depends upon the geographical, cultural and climatic conditions of the route to be covered.

Aircraft alone of all vehicles of transport is not tied down to any road; it therefore travels, when at all possible, along the large terrestial circle which connects the point of departure and the goal. But how important a factor the geographical conditions just referred to are, when the question of a relay flight in a giant airplane or a continuous flight in a dirigible is to be decided, will be realized when it is stated that the shortest route from New York to Peking, for instance, leads across the North Pole, which makes it plain that at present this trip could be made by airship only.

The fundamental difference in the use of giant airplane and dirigible may be best outlined as follows: An uninterrupted trip around the earth, that is, without intermediate landings, say on the parallel of Berlin, could even today be made by a German dirigible specially built for the purpose, presumably with perfect safety, in the direction from West to East, in from 10 to 14 days. A modern giant airplane can cover this distance only in stages by circumventing the large ocean areas, and under the condition of prearranged and, therefore, expensive landing fields at distances of 600 to 900 miles. The altitude airplane of the future may be able to fly the oceans and greatly reduce the number of stages, hence compete with the dirigible over long distances—not in respect to the useful load carried but in respect to speed.

It will therefore be seen that, disregarding the small airplane on long trips, only the dirigible is in position to choose the shortest route and to cover it without stop, and that in consequence it can compete with the greater speed of the airplane, which loses time by delays at the landing places and by possible changes of machines.

A Cushion Coupler

A CUSHION coupler device has been devised to absorb the first blow or shock transmitted by letting the clutch in suddenly on a rapidly revolving engine, or, on the other hand, to take up the torsional shock which comes in the other direction from the driving wheels of a car, due to quick breaking, or road irregularities. The device is so arranged that it will absorb the torque whether it is from the right or left; whether it orginates at the engine or rear wheels, or from both ends at once.

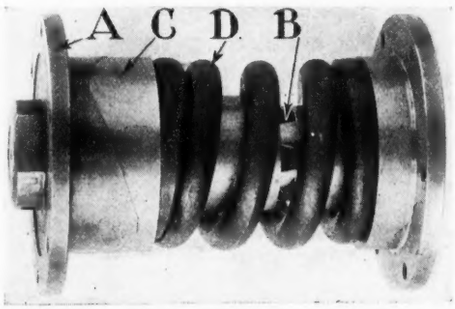
The manufacturers claim that the coupler protects the differential, axles and tires from the jerks and wrenches of over-acceleration and also smooths out the irregularities in the power flow from the engine.

The drive passes from the driving member to the driven member through cam faces held in contact by a powerful helical spring. Sudden applications of power will cause the cam faces to move in relationship with each other, and compares the helical spring, which absorbs the blow.

Referring to the illustration, the torque is applied to the flange of the cam member, A, which is freely mounted on the coupler shaft, B. As A begins to rotate, the cam member, C, is forced away from the upper member, thus compressing the spring D. This action continues until the pressure of the splines on the shaft B equals the torsionial force, where the drive becomes positive. The reverse action, although opposite in direction, is identical. One of the important features of the design is that the shaft B extends through the entire coupler and the distance between the flanges is constant.

The design of the cam faces permits a rotary or torsonial movement of 70 deg. This means that from one to ten or twelve power impulses from the engine, depending upon the engine speed and gear reduction, occur before the drive becomes positive. In other words, it is possible for the engine to expend a portion of its energy in winding up the springs on the coupler, thus tending to prevent stalling of the engine.

The device is fitted with a tubular grease tight cover so that lubricant for the splines is always present. The coupler can be placed on the rear end of the propeller shaft, or on trucks having the gearset amidship, the equalizer can be placed on a jack shaft between the gearset and engine as well as on the propeller shaft. In production jobs the coupler can be built in as an integral part of the propeller shaft, rear axle or gearset assembly, as desired. The device is manufactured by the Flexo-Motive Corp.



Flexo-Coupler with grease cover removed showing the construction and assembly of the cam and drive members

Research Work on Electroplating

DURING the month of May a number of meetings were held by the American Electrochemical Society in the interest of research work on electrodeposition, these meetings being attended by a representative of the Bureau of Standards. Plans were made for the formation of a division of the society to be concerned wholly with this kind of work. If such a division is organized it will be a distinct advantage in bringing together persons interested in this field and thereby stimulating research work along electrochemical lines.

Letters have been sent out by the National Research Council to about 200 representative manufacturers in whose plants electroplating is an essential process. The purpose of these letters is to inquire whether they would be willing to furnish financial support toward research work on electrodeposition. If such support is received, it is expected that the funds will be expended for research work conducted at the Bureau of Standards under the general supervision of an advisory board.

Grinding in the Automotive Industry

Part IV—Finishing Engine, Transmission and Chassis Parts

In this, the concluding article in this series, the subject of methods used in grinding crankshafts, flat faces, camshafts, gear teeth, splines and other parts are considered and allowances for metal removal are given.

By P. M. Heldt

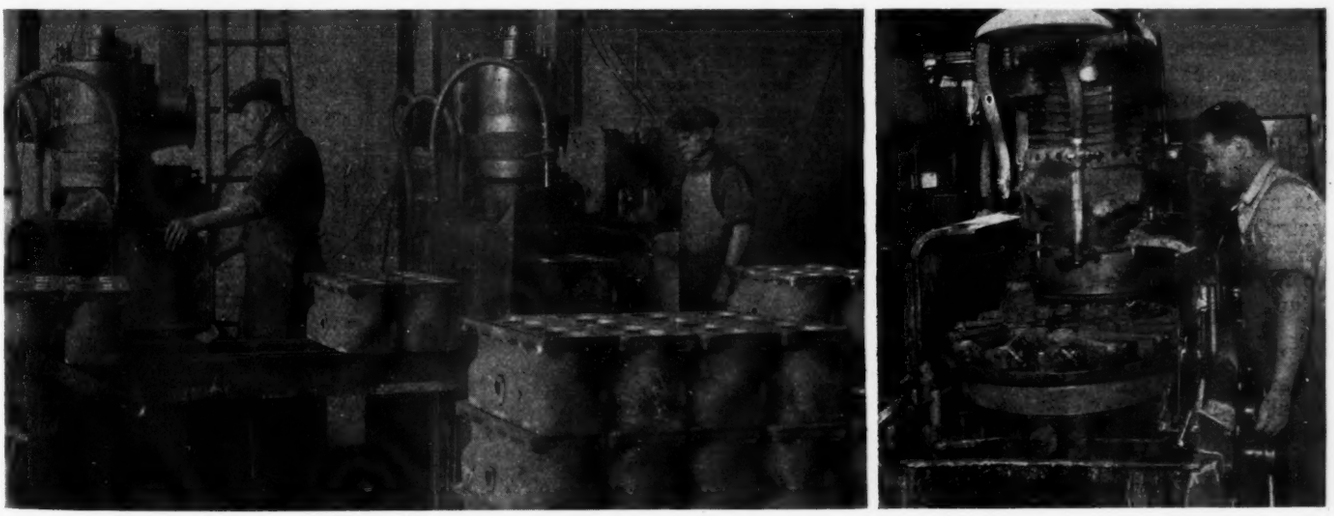
THE crankshaft is one of the most important parts of the engine so far as grinding operations are concerned. As has repeatedly been stated, by grinding it is possible to form a truer and smoother surface than by means of cutting tools, and as the crankshaft comprises from six to thirteen bearings operating at high speed, these better bearing surfaces result in a considerable reduction in friction losses and an increase in the life of the bearings. Crankshafts are heat treated and show a considerable degree of hardness, which is one of the reasons that it is impossible to get the desired finish with lathe tools. Of course, even in the untreated state the bearings cannot be turned sufficiently smooth and must be filed and polished afterwards. This method of hand finishing is rather tedious and also is inaccurate unless a very skilled operative does the work. Therefore the draw-filing and polishing were replaced by grinding. Sometimes the rough turning is done before the shaft is heat treated, when it can be machined more readily.

Crankpin Grinding

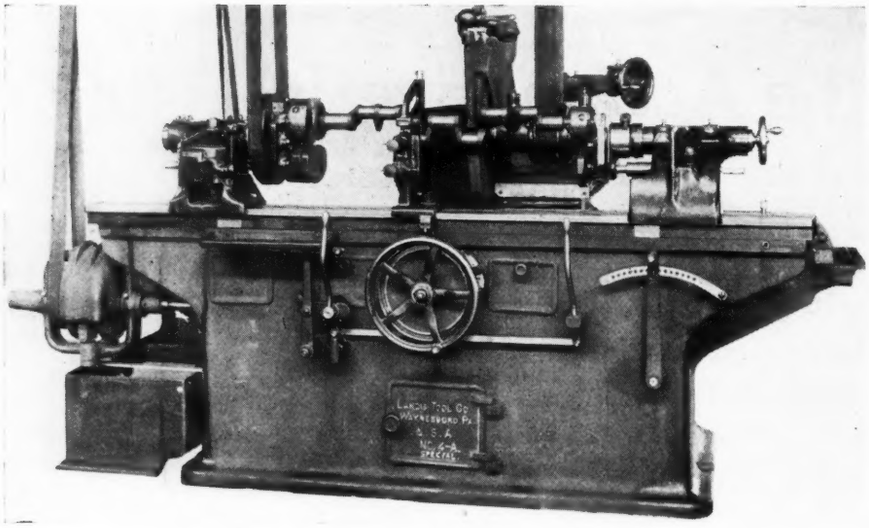
Grinding the main bearings presents no particular difficulty, as the shaft can be put into an ordinary cylindrical grinder. A few manufacturers use case hardened crankshafts, in which case finishing by grinding is absolutely necessary. Among the latter is the International Motor Company, manufacturers of the Mack truck. The crank is forged from open hearth steel with 0.10 to 0.20 per cent carbon content, and after carbonizing and quenching it shows a scleroscope hardness of 80 or more. In the rough turning 0.050 in. of stock is left on the diameter, and this is removed in two grinding operations, a rough and a finish grind. The roughing operation removes 0.035 in. of this and the finishing operation the rest. Practice as to the amount of material or stock allowed for the grinding operations varies considerably. Thus another manufacturer having an engine of substantially the same size as that just referred to removes 0.045 in. of stock from the front and rear bearings and 0.060 in. of stock from the center bearing in the rough grinding operation and from 0.005 to 0.008 in. on all bearings in the finishing operation.

Standard Fillets

In the grinding of both main bearings and crankpins, wheels of large diameter must be used, so that the wheel clamping collets will not interfere with the adjacent crank arms. It is customary to use the wheels for other classes of work after they have worn down to a diameter such that they can no longer be used for crank main journal and crankpin grinding. All crank journals must be provided with fillets, and when the grinding wheels are trued up they must have their corners rounded to a corresponding diameter. Too great a variety in the sizes of fillets used has caused considerable annoyance in the past, and in consequence the S. A. E. a year ago standardized the fillet radii for crank bearings as follows: The wheels are



(Left) Grinding bottom flange of cylinder block in Blanchard grinder. (Right) Grinding ends of connecting rod head in Blanchard grinder



Grinding crank pins in Landis crankshaft grinder

to be made in nominal widths of 1½, 1⅝, 1¾, 2, 2⅛, 2¼, 2⅜, 2½, 2¾, 3, 3¼, 3½, 3¾ and 4 in. and the radii of the edges are to be 3/32 in. max. Grinding wheel manufacturers allow 0.029 in. extra width for truing.

As an example of production in crankshaft grinding the following may serve: In the Buda plant 2½ in. four cylinder crankshafts with three main bearings are put through the rough grinding operation on the main bearings at the rate of 55 per eight-hour day and through the finish-grinding operation at the rate of 58 per eight-hour day. All bearings are inspected and must be concentric to within 0.001 in. A scleroscope test is also made and must show between 41 and 45 points hardness. This, of course, is a heat-treated shaft.

Production in Crankshaft Grinding

For grinding the crankpins the crankshaft must be placed in the grinding machine with indexing and balancing fixtures. Roughing and finishing operations are also required by the pins. In the case of the Buda crankshaft above referred to, 0.060 in. stock is removed in the roughing and 0.010 to 0.015 in. in the finishing operation. The tolerances are plus and minus 0.001 in. and the production is 60 per day of eight hours for each of the two operations.

On most automobile engine crankshafts only the journals, the flywheel flange and a possible clutch pilot are finished, the crank arms being left in the rough. In aircraft engines, however, and in general European practice the crankshafts are finished all over. Since the war some of the manufacturers of high grade cars in this country have begun to finish their crankshafts completely, and this involves additional grinding operations. Thus the Packard Motor Car Co. finishes the contour of the crank arms of its single-six model in a grinder operating on the same principle as a cam grinder. In this operation the crankshaft is revolved at the rate of 9 r.p.m., about ⅛ in. stock is removed and the contour is held to within 0.010 in. of blue print dimensions. The faces and circumferences of the thrust flanges and flywheel flange are also ground.

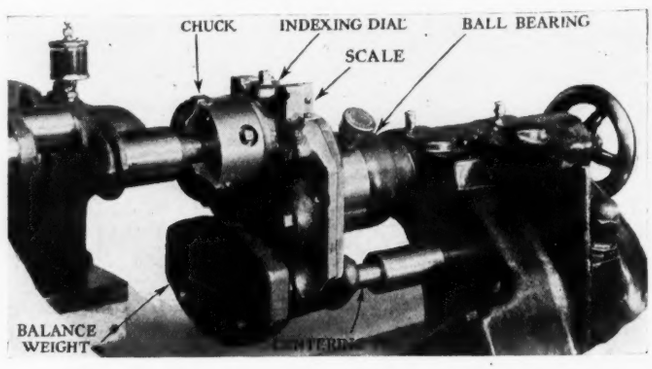
Poppet valves are ground both on the seat and on the stem. Special grinding machines and special fixtures for grinding the seats of such valves have recently been introduced by a number of manufacturers. The valve is held by its finished stem in a chuck and the grinding wheel, set at the proper angle, is fed up toward the seat. The stem is turned and ground between centers, but the lower center is usually cut away later.

Camshaft grinding is a branch of the grinding industry by itself. Not only the contours of the cams but also the bearings are ground, but the first operation, of course, involves the greatest difficulties. These surfaces are case hardened and, therefore, call for a comparatively hard wheel. The usual plan is to mount the grinding wheel spindle on a slide which is actuated by a master cam four or more times the size of the cam to be ground and an exact enlargement thereof. Cam grinding machines and cam grinding attachments for universal grinders are made by the Landis Machine Co. and the Norton Co., and the Rolls-Royce Co. make a machine of this kind for their own use under their own patents. Sometimes a so-called constant acceleration cam is used, in which case the flanks of the cam are concave and small diameter grinding wheels are required. Occasionally the camshafts carry an eccentric for the oil pump and are provided with an end thrust flange, both of which must also be ground. If the cam contours are ground with a cylindrical surface, the diameter of the grinding wheel has an influence on the form of contour produced, and wear of the wheel must therefore be allowed for.

The remaining parts of the valve gear, that is, the push rods and the rollers, therefore, are also ground. In the works of the International Motor Co. two grinding operations are performed simultaneously on the hardened cam roller. While the roller is held in a chuck the hole is ground with a ⅜ in. wheel of ⅜ in. face, which runs at 30,000 r.p.m. and removes 0.003 in. of metal. As this wheel feeds into the hole a saucer wheel running at 1800 r.p.m. comes into contact with the face of the wheel and removes from 0.002 to 0.005 in. of material. The production is 50 rollers per hour.

Face Grinding of Housings

Until recently the joint surfaces of machinery casings were generally finished in continuous milling machines, and this is still the practice where soft materials, such as aluminum, are concerned. However, if the cases and their covers are made of relatively hard material, particularly cast steel, there is now a tendency to finish the joint surfaces by grinding. Cast steel and semi-steel casings are used to some extent in truck and tractor practice, and it is in the truck and tractor industry that equipment for surface grinding housings and covers is most frequently seen. A part in point is the cover for the camshaft gears which, if the engine has three-point suspension with one point in the form of a trunnion on the hub of this cover,



Foot stock, clutch, balance weight and indexing device on Landis crankshaft grinder

Cam grinding in Norton grinding machine (Note back rest)

must be made quite strong. Such covers can be ground to advantage in surface grinders with vertical wheel spindles, a special fixture being required for holding the work on the table. This fixture supports the cover under the flange which is to be finished off so it cannot spring away, thus helping to secure an oiltight joint. Similar surface grinding operations are performed on the oil pan joint, water jacket covers, bell housing and exhaust manifold.

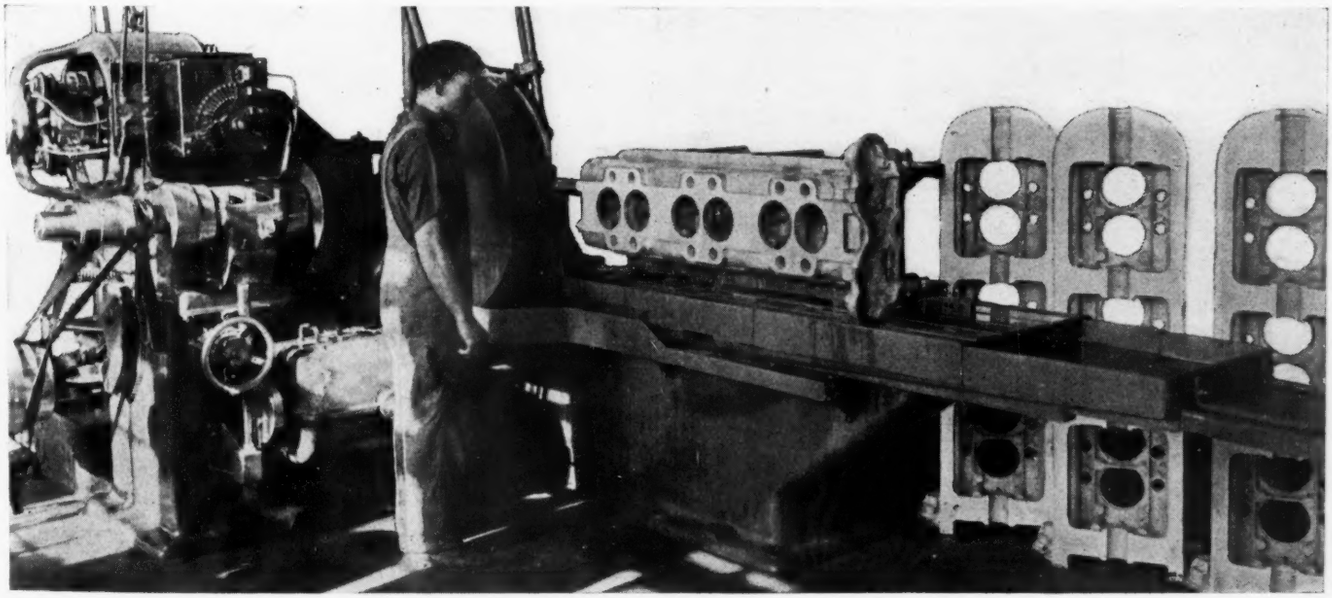
The above will suffice to show that in the manufacture of automotive engines as carried on to-day there is hardly a part of any importance, with the exception of the flywheel, in the production of which one or more grinding operations are not performed. Cost of production is an important factor, and no doubt the introduction of grinding has done its share toward the reduction of manufacturing costs and thereby to make possible the enormous outlets for automotive equipment. But it can also not be denied that grinding has resulted in better work and made for a superior product.

Gear Grinding

In passing from the engine to the transmission parts, we may skip the clutch, for although there are a number of operations on a typical design of clutch that can be done to advantage in the grinding machine, there are very similar operations in the gearset, and we thus avoid useless repetition. In the manufacture of the gearset, grinding also plays an important part, for one reason because hardened steel parts are largely used. The gears of the gearset are either oil hardened or case hardened after they are cut, and as this tends to distort the teeth, it is a good plan to allow a slight amount of surplus stock in the cutting operation and grind the teeth after hardening. In a recent article we described the Maag method of grinding the teeth of hardened gears, in which the wear of the saucer-shaped grinding wheels is compensated for automatically by means of an electric contact device. In this country the Gear Grinding Machine Co. has developed a system of grinding gears after hardening which has met with considerable success.

There are two basic methods of gear grinding. One is based on the fact that the rack tooth of the involute system has straight side flanks; hence a gear wheel cutting with its straight side, when placed at the proper angle relative to the pitch circle at the tooth flank being ground and moved tangentially to simulate the motion of a rack tooth relative to the gear, will give the correct tooth outline. The other method consists in the use of a grinding wheel with a formed grinding surface and is very similar to the cutting of gears by means of a milling cutter. The grinding surface of the wheel is trued by means of three diamonds, the truing operation being performed without removing the wheel from the machine. One of the diamonds is traversed across the straight top of the grinding wheel which grinds the bottom of the tooth space and the other two true each one of the sides of the wheel by which the involute flanks of the teeth are ground. The level of the traversing diamond is the datum line of the machine, the grinding wheel arbor being mounted above it and the work arbor below. As the grinding wheel cutting surface wears away its center is lowered to bring its lower edge down to the datum line again. The two truing diamonds for the sides of the grinding wheel are guided by means of cams enclosed within the machine, whose outlines correspond to the form of the teeth to be cut.

It is obvious that a different pair of cams are required for each form and pitch of tooth. In making these cams, templates of aluminum of eighteen times the size of the tooth are first made; these are then mechanically reduced



Grinding top half of aluminum crankcase in Diamond surface grinder

to six times actual size and duplicates of these reduced cams are fixed in the machine.

Stock Allowance for Grinding Gears

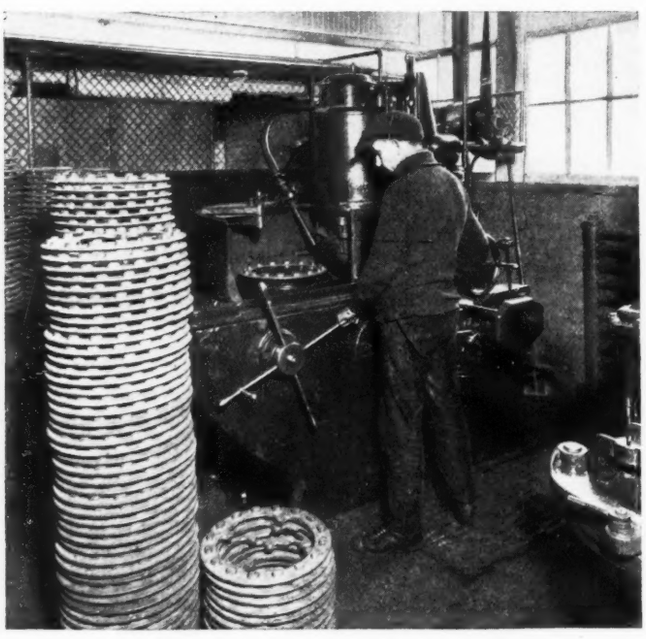
When gears are thus ground after case hardening, no attempt is usually made to get a very accurate tooth outline in the cutting process and stock for grinding is allowed in the cutting. At the bottom of the tooth gap about 0.010 in. of stock is allowed for grinding in the case of transmission gears, and on the tooth flanks, from 0.006 to 0.009 in. The allowance at the bottom of the tooth space is a matter of no great consequence, as this is not a working surface; on the other hand, the allowance on the flanks must be strictly limited, because otherwise the grinding wheel is apt to cut through the case of a case-hardened wheel and thus cause a soft spot in the flank.

Gears are generally ground in gangs, and in order to ensure accuracy it is necessary that the bores be ground out accurately and that the ends be ground square with the bores. These gear grinding machines are not manufactured for the market, but built by the Gear Grinding Machine Co. merely for its own use, the company contracting to grind customers gears that have previously been finished up to the grinding stage.

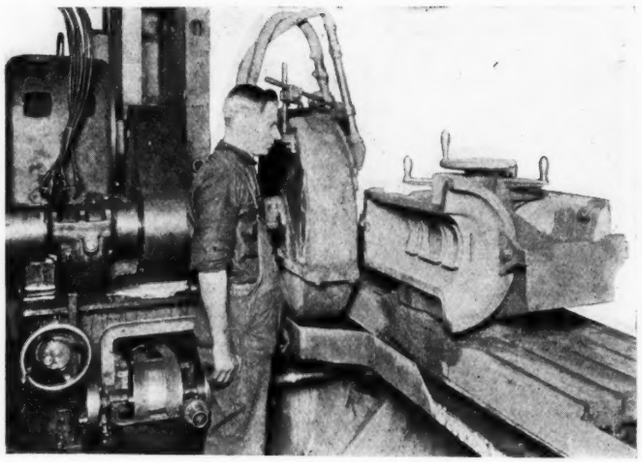
Grinding of Splines

The shafts of gearsets are generally mounted in ball or roller bearings, and the seats for the bearing rings, both on the shafts and in the housing, should be ground. The primary shaft of the transmission, moreover, is provided with driving splines, and as the shaft is hardened after having the splines milled, the latter are likely to be distorted, hence the finishing operation should preferably be by grinding. This operation can readily be performed in a universal grinding machine with a wheel having its circumference dressed to the exact form of the groove between splines. Lately the Gear Grinding Machine Co. has also been grinding splined shafts on the same principle as that employed by it in grinding gears.

For a long time there was a great deal of controversy as to whether the sliding gears of the transmission should bear on top of the splines or on the bottom surface of the grooves. There was not much advantage one way or the other, because while the top surface of the splines on the shaft and the inner surface of the teeth in the gear could be finished quite accurately, it was quite difficult to accurately finish the bottom of the grooves on the shaft and the bottom of the keyways on the gear, so in either case one surface was not very accurate. Since the splines on the shaft are ground this difficulty has been overcome, and it is now the general practice to support the gears on the bottom of the spline grooves, which necessitates the grinding out of the bores of the gears. This is done in an internal grinding machine, and the most interesting feature in connection with this operation is the method of holding the gear while it is being ground. Evidently, for quiet running, the gear must turn concentrically with its pitch circle, and how to get the bore of the gear after its final grinding concentric with the pitch is the problem. There are three methods of holding the gear in the grinding machine for grinding the bore, namely, by the top of the teeth, by means of rolls contacting between the teeth at the pitch circle and by means of wedge blocks with narrow teeth entering between the gear teeth and bearing against the bottom of the tooth spaces.



Grinding clutch disks in Blanchard grinder

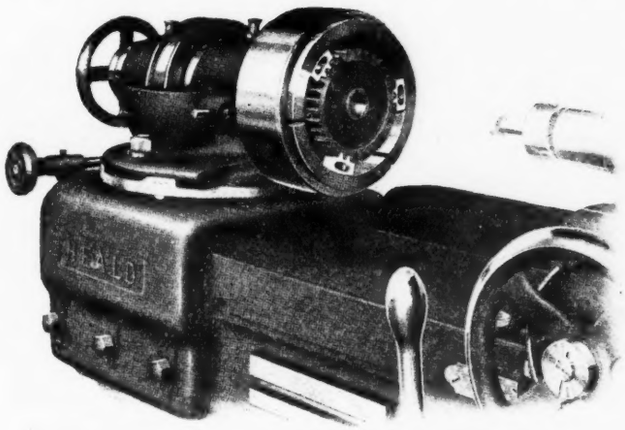


Grinding crankcase bottom half in Diamond surface grinder

Holding Gears for Grinding Bores

Holding the gear at the top of the teeth does not give accurate results, because the pitch circle is not necessarily concentric with the outside circle, having been formed or determined in a different operation. From theoretical considerations it would appear that the best way would be to hold the gear by rolls contacting between the teeth, and this is undoubtedly correct if the gear is an unhardened one. But if the gear is hardened the teeth are likely to have become distorted, with the result that the tooth spaces are no longer of uniform width. Each roll will then enter between the teeth to a different depth, and the circle of the roll centers will no longer be concentric with the pitch circle. For such cases the best method is undoubtedly what is known as the root control method. The root circle and the pitch circle are formed in the same operation and their concentricity is not materially disturbed by the hardening process. It may be pointed out here that the accuracy of the pitch line roll support method may be improved by the use of a greater number of rolls than the three which is the least possible number that can be used. The line cut on page 426 shows two methods of holding gears in the grinding machine for grinding the bore that have been worked out by the Heald Machine Co. When using the roll method, the rolls must of course be all of exactly the same diameter.

The roll method can be improved upon by having two or



Heald method of holding gears in chuck for internal grinding

three rolls on each collet jaw which will average up any irregularities that may exist in the teeth. The rolls are provided with tapering ends so as to make it easy to insert them between the teeth and also to make it easy to get them into the chuck along with the gear. They are carried loosely in a light metal ring or retainer, which allows them to enter freely between the teeth of the gear and adjust themselves to any irregularities. The mounting of the rolls in a retaining ring instead of on the collet jaws enables the operator to more easily keep dust and grit from getting behind the rolls where they would be likely to affect the accuracy of the chucking. For the sake of accuracy the rolls must be backed up by hardened steel blocks to take the pressure of chucking, as they would bed into soft material and become inaccurate. This hardened surface must be reground occasionally to maintain the accuracy. In addition to plain single spur gears, so-called spool gears, and also bevel gears must be held in the machine for grinding the bore, and fixtures for doing this have been worked out.

The halves of the gear case and the cover therefor can have their joint surfaces ground on a surface grinder, and a machine with a horizontal wheel spindle would ordinarily be used for the heavier parts.

In connection with the final drive and rear axle there are also many parts that are finished by grinding. If the machine has a bevel gear drive the crown gear is usually ground on the flange where it fits to the differential flange; the rear axle driving shafts and the pinion shaft are ground, and so are the seats for the bearings on the differential housing and in the axle housing. Grinding is also resorted to for correcting distortion due to heat treatment of the worms of worm drives. Passing to the front axle, the steering knuckle spindles are ground, as are the ball joints of the drag link, both on the ball surface and the taper surface by which they are fitted into the knuckle arms.

Snagging Castings and Forgings

Aside from precision work, a great deal of snagging is done on automotive parts, both castings and forgings. Formerly, when a lot of castings came from the foundry, a man with a cold chisel and hammer was set to work on them to take off the rough edges by chipping, but the snagging process is a great improvement on that method. For very heavy parts portable grinders are used, while light parts are toted to a stationary grinder, either of the floor stand or the bench stand type. Snagging is done on practically all castings and on some of the larger size forgings.

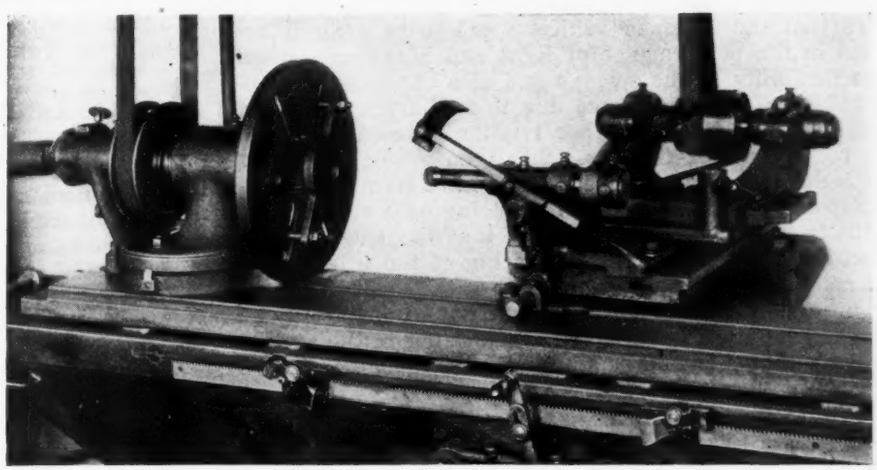
Trimming Joints

A further use of grinding machinery in automotive shops is in trimming the rough edges of fitted joints, whether these joints be between castings, sheet metal parts or forgings or between parts of different kinds. For instance, in the Mack trucks the spring hangers are clamped to the frame and the joints are then caulked. The roughness of the caulked joints is then smoothed off by means of a medium coarse wheel. The engine bonnet and the cab of the Mack truck are built up of a combination of sheet and strip steel, and the rough edges are smoothened by means of portable grinders. The bodies are similarly gone over with the portable grinder and all projecting screw heads, burs and sharp edges are smoothed.

Grinding machinery is extensively used in the plants devoted to the production of the components thereof and of accessories the same as in plants producing complete automotive vehicles. This applies to none of the parts or allied industries so much as to the manufacture of antifriction bearings. In fact, with the exception of the ball or roller cages, these are finished completely by grinding. Steel balls for use in ball bearings are made in special machines developed by the manufacturers of the balls themselves. The balls are made of chromium steel, hardened all through. They are ground to an approximate size and then graded by gaging.

Grinding Ball Bearing Races

The races are turned roughly to size and are then heat-treated. After the hardness test the sides are surface-ground on rotary surface grinders with magnetic chucks; in fact this operation is somewhat similar to grinding the sides of piston rings. The S. K. F. Ball Bearing Co. uses silicon ring wheels for this operation, 18 in. in diameter by 1¼ in. rim, running at 950 r.p.m., and removing approximately 0.006 in. of stock from each side of the ring. For turning the ball grooves in the inside rings and turning off the outer surface of the outside rings the rings are mounted on arbors in gangs. The ball grooves in the inner rings are ground by means of silicate wheels with an oscillating wheel mount which shapes the groove. One groove is ground at a time. A wheel speed of 6000 ft. per min. is used and from 0.020 to 0.025 in. of stock is re-



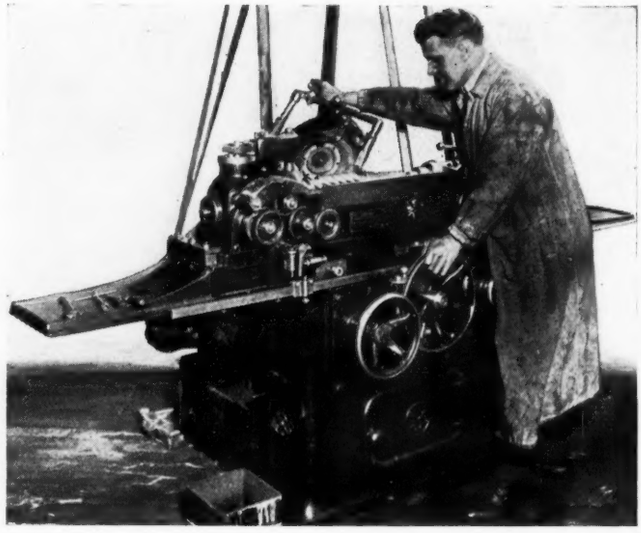
Grinding out the bore of a gear wheel in a Brown & Sharpe universal grinding machine

moved. Both a roughing and a finishing operation are required for the outer surface of the outer ring. In roughing, the diameter is reduced by about 0.020 in., and in finishing by 0.010 in. A circumferential speed of 5500 ft. is maintained.

The grooves in the outer rings are also ground in an oscillating grinding machine. In this case, instead of the wheel carrier, the work carrying head is oscillated, and a true spherical groove is formed. Bores in inner rings are ground in automatic machines, and for the smaller sizes naturally very small diameter wheels must be used. In grinding the bores from 0.006 to 0.008 in. is removed if measured on the diameter.

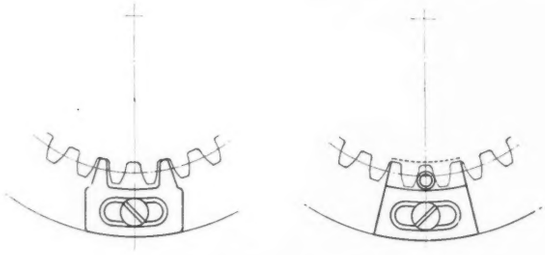
Grinding Parts of Electrical Equipment

One of the newer subsidiaries of the automotive industry, the electrical equipment industry, also makes use of grinding to quite an extent. Formerly the completed commutators, after being turned down in the lathe, were filed and lapped with fine emery paper. To-day they are finished by grinding. The armature cores of generators and starters, which are built up of thin soft iron laminations slightly separated by an insulating varnish, so as to prevent good electrical contact between them, are now finished by grinding. Owing to the softness of the steel used for the disks and the difference in the cutting qualities of the steel and the insulating layer in between, this was always a rather unsatisfactory lathe job. In the grinder, not only can the job be done more expeditiously, but there is probably less burring of the edges of the disks, with consequent better insulation. The pole pieces of generators and starter are ground to the required diameter, and often the field frames are ground for the attachment of the field poles. The grinding out of the pole pieces is a particularly delicate operation in the case of the magneto, as there the clearance is made exceedingly small.



Grinding steel worms for truck drives (Timken-Detroit Axle Co.)

Non-metallic parts of electrical equipment also can be finished to advantage by grinding. Thus the distributor with its molded-in metal segments is preferably finished by grinding, and the carbon brushes, which are made from extruded bars, are cut off to length by means of thin elastic wheels. The radius is ground on the bearing surface of these brushes by means of silicon carbide wheels so they do not have to be fitted to the commutator surface by hand by the consumer.



Methods of centering gears for grinding of bore (Root control and pitch line control)

Dependence of Riding Qualities on Car Weight

A MATHEMATICAL investigation of the problem of vehicle suspension is published in Der Motorwagen of June 20 by Prof. H. Reissner. The question particularly investigated is whether it is possible to so design small cars that they will ride as comfortably as large cars. It is found that for the same road obstruction and the same vehicle speed there is no difference in the performance of light and heavy cars when the flexibility of the springs and also the damping constant (the frictional force due to leaf friction or leaf friction and shock absorber friction) are proportional to the weight of the car. Small unsprung weight of wheels and axle are of great importance from the standpoint of prevention of wheel bouncing on a rough road. Finally the conclusion is drawn that the shock reduction and the freedom from bouncing of the wheels may be made independent of the weight of the car if the static compression (which should be a maximum) of the springs under load and the ratio of the unsprung to the sprung weight (which should be a minimum) are made the same for both types of car.

Prof. Reissner says he has found that small cars in general are less well sprung than large cars, and he admits that the objection may be made to the principle laid down by him that it is more difficult from a design standpoint to provide the same static spring deflection in a small as in a large car, because it is generally desired to have the light car lower; also that in the case of the light car there is a greater difference between empty weight and loaded weight, and if the car is sprung for full load the springing will be poor when running with small load. However, the solution of the problem of adequately springing the light car is so important to the success of this type of vehicle that it must be found.

Further Lamp Standardization by S.A.E.

THE standardization of tail-lamp overall dimensions and mounting screws has been undertaken by the S. A. E. Standards Committee. At the present time there are a great variety of mountings used which could easily be reduced to one standard design, acceptable to both the lamp and the automobile manufacturer.

Standardized tail-lamps can be mounted on either the right or left-hand side of the license plate, thus eliminating the necessity of making right and left-hand lamps which is the practice at present. The tail-lamp dimensions recommended are in accordance with present practice.

It has been suggested that the present S. A. E. Standard for lamp glasses, be extended to specify the dimensions of the locking lugs of the head-lamp glass rim so as to prevent the glass turning in the lamp, which is a matter of importance in other than plain lamp glasses.

A Forward Step in Practical Merchandising Research

The general phases of territorial analysis were discussed recently in AUTOMOTIVE INDUSTRIES. This article describes how one automobile manufacturer is getting practical results from commercial research. The scope of the work is outlined and valuable suggestions are given.

By Norman G. Shidle

THERE are two big questions waiting to be answered accurately in detail at most automotive manufacturing plants. The first is, "What data have we at hand upon which to base an intelligent and intensive merchandising plan?" The second question is a continuation of the first and may read, "What other data do we need, how can we get it and how can we use it effectively after having obtained it?"

To adequately answer these questions means to establish and develop a sound merchandising program which will carry on successfully through the period of competition which lies ahead. Because the need for an answer is so pressing, it is interesting to examine the work which various companies are doing along this line. The beginnings of a broad plan, for instance, are now well under way at the H. H. Franklin Mfg. Co., and some constructive results have already been achieved after only a few months of effort.

A Commercial Research Department has been established at this plant to carry on a substantial part of this work in co-operation with the sales and advertising departments. All these are supervised and co-ordinated by the Director of Distribution.

The functions outlined for the Commercial Research Department at its inception indicate concretely the scope which its work is to take. These functions are as follows:

1. To lay out boundaries of dealers' territories along scientific lines and review contracts negotiated by the sales department.
2. To gather statistics bearing on the markets in which the company buys and sells.
3. To predetermine what the sales performance should be for the market as a whole and for each dealership.
4. To figure quotas and schedules for the market as a whole and for each dealership.
5. To keep statistical records of dealers, subdealers and salesmen's performance.
6. To analyze sales performance and point out faults and remedies.
7. To forecast economic conditions in markets in which the company buys and sells.
8. To analyze, construct or carry out routines and sales promotion plans, investigate methods, practices and policies.

The striking thing about this outline is the definite manner in which it states the various angles of the merchandising problem which confronts the automobile manufacturer. It indicates the basic lines of research to be laid down as a foundation for the conception and development of sound selling plans. To properly perform these functions, the department has been divided into four divisions, each of which performs a specific function. One division takes care of general work, such as research investigation, questionnaires, charts, methods, routines, forecasts, general file, sales promotion ideas and all special work referred to the department. In regard to the last item, it is interesting to note that this department has become a sort of clearing house for merchandising problems of various kinds referred to it by all branches of the selling and advertising organization.

A second division takes care of the various selling campaigns which are continually being operated. The entire dealer organization and dealer salesmen, for example, has been mobilized into the "Franklin Army." The salesmen take rank in this army in accordance with the results of their sales effort and, on the basis of his monthly sales record, a man may rise in rank from private to general.

The work of this division, assisting as it does the advertising and sales departments in promoting and devising these monthly and other periodic sales campaigns, has been a large factor in stimulating sales during the dull times and has been one of the most effective means of keeping the factory at capacity production during recent months. The work of this division includes awards of bonuses to salesmen and dealers, "Army" sheet records, dealers' and salesmen's records for prize campaigns, monthly sales campaigns, special reports to advertising department, special notices for *Salesometer*—the salesman house organ of this company—custody of order and delivery reports, etc. These order and delivery reports are discussed in greater detail at a later place in this article.

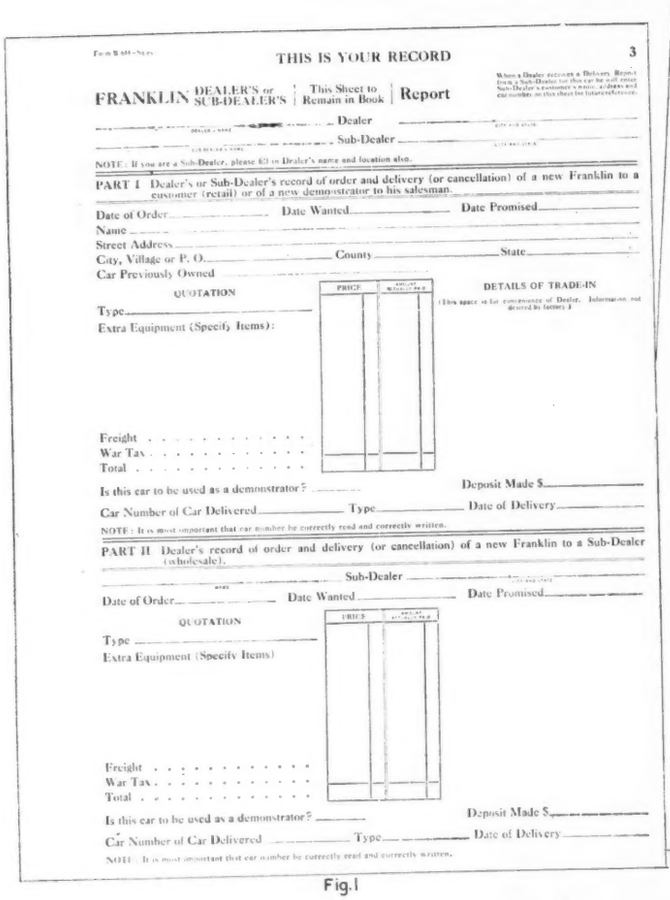
A third division handles all routine reports not included in the second division, such as cars in transit, dealers' and subdealers' stock on hand, demonstrators, wholesale and retail deliveries, car-record cards, car owner cards, etc.

The fourth division handles what is perhaps the most interesting phase of this commercial research work. Its task includes territorial studies, quota studies, schedule studies, review of new contracts, outside statistics, such as population, registration, wealth and economic production; map records, etc.

Territory Layout

The work of properly laying out territories has been one of the major tasks. Proper territories cannot be laid out with reference only to a map. Factors such as transportation lines, major highways, urban spheres of influence, etc., must all be considered. The ideal merchandising plan, however, is one which is predicated upon small territories, intensely cultivated.

This new department has taken up the work of scientifically laying out territories. Although it is operating



THIS IS YOUR RECORD 3

FRANKLIN DEALER'S or SUB-DEALER'S | This Sheet to Remain in Book | Report

When a Dealer receives a Delivery Report from a Sub-Dealer for this car he will enter Sub-Dealer's customer's name, address and car number on this sheet for future reference.

Dealer _____

Sub-Dealer _____

NOTE: If you are a Sub-Dealer, please fill in Dealer's name and location also.

PART I Dealer's or Sub-Dealer's record of order and delivery (or cancellation) of a new Franklin to a customer (retail) or of a new demonstrator to his salesman.

Date of Order _____ Date Wanted _____ Date Promised _____

Name _____

Street Address _____

City, Village or P. O. _____ County _____ State _____

Car Previously Owned _____

QUOTATION — PRICE — DETAILS OF TRADE-IN (This space is for convenience of Dealer. Information not desired by factory.)

Type _____

Extra Equipment (Specify Items):

Freight . . . . . .
War Tax . . . . . .
Total . . . . . .

Is this car to be used as a demonstrator? _____ Deposit Made $_____

Car Number of Car Delivered _____ Type _____ Date of Delivery _____

NOTE: It is most important that car number be correctly read and correctly written.

PART II Dealer's record of order and delivery (or cancellation) of a new Franklin to a Sub-Dealer (wholesale).

Sub-Dealer _____

Date of Order _____ Date Wanted _____ Date Promised _____

QUOTATION — PRICE

Type _____

Extra Equipment (Specify Items)

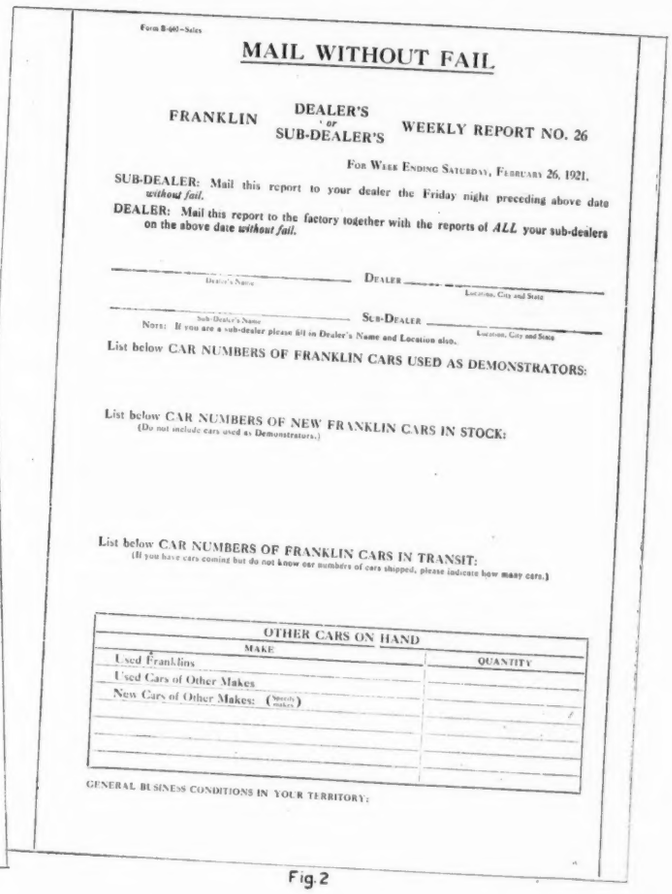
Freight . . . . . .
War Tax . . . . . .
Total . . . . . .

Is this car to be used as a demonstrator? _____ Deposit Made $_____

Car Number of Car Delivered _____ Type _____ Date of Delivery _____

NOTE: It is most important that car number be correctly read and correctly written.

Fig. 1



Form B-660—Sales

MAIL WITHOUT FAIL

FRANKLIN DEALER'S or SUB-DEALER'S WEEKLY REPORT NO. 26

For Week Ending Saturday, February 26, 1921.

SUB-DEALER: Mail this report to your dealer the Friday night preceding above date *without fail.*

DEALER: Mail this report to the factory together with the reports of *ALL* your sub-dealers on the above date *without fail.*

Dealer's Name _____ Dealer _____ Location, City and State

Sub-Dealer's Name _____ Sub-Dealer _____ Location, City and State

Note: If you are a sub-dealer please fill in Dealer's Name and Location also.

List below CAR NUMBERS OF FRANKLIN CARS USED AS DEMONSTRATORS:

List below CAR NUMBERS OF NEW FRANKLIN CARS IN STOCK:
(Do not include cars used as Demonstrators.)

List below CAR NUMBERS OF FRANKLIN CARS IN TRANSIT:
(If you have cars coming but do not know car numbers of cars shipped, please indicate how many cars.)

OTHER CARS ON HAND	
MAKE	QUANTITY
Used Franklins	
Used Cars of Other Makes	
New Cars of Other Makes: (Specify Makes)	

GENERAL BUSINESS CONDITIONS IN YOUR TERRITORY:

Fig. 2

conservatively and is correlating its studies with the necessities of present conditions, excellent progress has been made.

One of the first problems encountered by this department was that of bringing up-to-date data concerning the number of Franklin cars already in use in each of the various sales territories. This work was done outside the company by a statistical organization employed for the purpose. The information was essential, however, to the making of future plans and to the establishing of quotas.

Next a plan for keeping this information up-to-date at all times was worked out. This is accomplished by means of three forms, each one of which is filled in by the dealer. The first is an "Order Report" and is filled in by the dealer and mailed to the factory at the time an order for a car is taken. The second is similar to it, except that it contains an extra line, which records the actual delivery of the car. The third is kept by the dealer as his record and contains all the facts on the other two. A sample of this third form is shown in Fig. 1.

By means of the form in Fig. 2 the factory is kept informed as to the exact status of every Franklin in every dealer's territory, including those cars which have changed hands. This weekly report is filled out by the dealers and mailed to the factory. Fig. 2 shows both sides of this form.

On the basis of the data compiled and kept up-to-date from these forms, it is possible to make up one factor in the formula for determining quota. Moreover, a close examination of these forms will reveal to the sales manager a number of other advantages to be gained from so highly developed a system of dealer control and cooperation.

The form shown in Figs. 3 and 4 are, to a large extent, explanatory and illustrate further the possibilities of close merchandising control of the dealer organization. Fig. 3 shows the form on which county deliveries and registration are recorded from month to month, the county being a fixed territorial unit, whereas dealer boundaries include often several counties and are subject to change.

By means of this record it is possible at any given time to determine readily how the dealer who controls this county is keeping it up to quota, the variation in his sales curve, and the quality of his performance in this county as compared with that of competitive cars. The blank columns are used for posting performance of competitors.

Fig. 4 is a comparative record of the dealer's sales performance for his whole territory. At the top of the sheet is placed the sales quota for the year, the number of Franklins to a unit of population and the percentage of total deliveries that should be Franklin sales. An examination of the details of this form will show the variety of valuable merchandising information which its record gives to the sales manager.

Before such a form can be used, however, it is obvious that considerable foundation work must have been done; certain standards of performance must have been set up. The work of this research department, consisting partly of the gathering of the data described in Figs. 1 and 2, is to set up such standards and to change them from time to time on the basis of newly ascertained facts.

Territorial Analysis

One of the chief problems of interest to the automobile sales manager is that of accurate territorial analysis; the determining as closely as possible of just how much business is actually available in a given dealer's territory. Thus, a quota can be established and sales performance checked against this standard.

The establishing of territorial quotas has been studied closely by this new Franklin department and a satisfactory formula for present practical use has been worked out on

FORM S-639—SALES

STATE ○ COUNTY ○ DEALER ○

COUNTY DELIVERIES AND REGISTRATION RECORD	FRANKLIN							SENNETT			BENNETT			BUSINESS CONDITIONS
	a	b*	c	d*	e	f*	g	h	k	l	m	n	o	
	DELIVERIES PER MONTH	DELIVERIES PER MONTH	DELIVERIES SO FAR THIS CONTRACT YEAR		CUMULATIVE TOTAL CARS IN COUNTY TO DATE			CUMULATIVE TOTAL CARS IN COUNTY TO DATE	DELIVERIES THIS PERIOD	DELIVERIES SO FAR THIS CONTRACT YEAR	CUMULATIVE TOTAL CARS IN COUNTY TO DATE	DELIVERIES THIS PERIOD	DELIVERIES SO FAR THIS CONTRACT YEAR	(NO REPORT MEANS NORMAL)
	DEALER	DEALER			ACTUAL		FROM REGISTRATION REPORTS	FROM REGISTRATION REPORTS			FROM REGISTRATION REPORTS			
DATE	FROM DEALER'S REPORTS													
	PEG COUNT	TOTAL	PEG COUNT	TOTAL	DEALER	DEALER	DEALER	DEALER						
END OF CONTRACT YEAR 1921-22														
Aug. 1 to Sept. 1														
July 1 to Aug. 1														
June 1 to July 1														
May 1 to June 1														
April 1 to May 1														
March 1 to April 1														
Feb. 1 to March 1														
Jan. 1 to Feb. 1, 1922														
Dec. 1 to Jan. 1														
Nov. 1 to Dec. 1														
Oct. 1 to Nov. 1														
Sept. 1 to Oct. 1														
END OF CONTRACT YEAR 1920-21														
Aug. 1 to Sept. 1														
July 1 to Aug. 1														
June 1 to July 1														
May 1 to June 1														
April 1 to May 1														
March 1 to April 1														
Feb. 1 to March 1														
Jan. 1 to Feb. 1, 1921														
Dec. 1 to Jan. 1														
Nov. 1 to Dec. 1														
Oct. 1 to Nov. 1														
Sept. 1 to Oct. 1														
END OF CONTRACT YEAR 1919-20														
Aug. 1 to Sept. 1														
July 1 to Aug. 1														
As of July 1, 1920														

Read Up *NOTE: Use

Fig. 3

FORM S-638—SALES

COMPARATIVE RECORD OF DEALER'S SALES PERFORMANCE

POSTED FOR PERIOD_____

_____DEALER SALES QUOTA FOR CONTRACT YEAR_____

AVERAGES FOR U. S. AT THIS DATE { 1 FRANKLIN TO EVERY_____OF POPULATION (n) ; 1 CAR EXCEPT FORD TO EVERY_____OF POPULATION (o) ; FRANKLIN DELIVERIES SHOULD CONSTITUTE MORE THAN ____% OF DELIVERIES OF BENNETT (p)

STATE AND COUNTY	a POPULATION THOUSANDS 1920 CENSUS	FRANKLIN b DELIVERIES SO FAR, THIS CONTRACT YEAR (ACTUAL)	FRANKLIN c TOTAL CARS IN COUNTY TO DATE (ACTUAL)	SENNETT d DELIVERIES SO FAR THIS CONTRACT YEAR (FROM REGISTRATIONS)	SENNETT e TOTAL CARS IN COUNTY TO DATE (FROM REGISTRATIONS)	BENNETT f DELIVERIES SO FAR THIS CONTRACT YEAR (FROM REGISTRATIONS)	BENNETT g TOTAL CARS IN COUNTY TO DATE (FROM REGISTRATIONS)	RATIO OF DELIVERIES TO SALES QUOTA: DELIVERIES	SALES QUOTA	% OF SALES QUOTA v ÷ w	TOTAL CARS THERE SHOULD BE: BASED ON POPULATION-AVERAGE FRANKLIN a·n	BASED ON POPULATION-AVERAGE SENNETT a·o*	PURCHASING POWER FACTOR g·k	FRANKLIN BASED ON PURCHASING POWER h·l
COUNTIES SHARED WITH OTHER DEALERS. (INSERT TOTALS AND PERCENTAGES HERE. POST BELOW.)														
1	%			%	%	%	%	FOR THIS PERIOD						
2	%			%	%	%	%	SO FAR THIS CONTRACT YEAR						
3	%			%	%	%	%	h	k	l	m			
4	%			%	%	%	%							
5	%			%	%	%	%							
6	%			%	%	%	%							
7	%			%	%	%	%							
8	%			%	%	%	%							
9	%			%	%	%	%							
10	%			%	%	%	%							
11	%			%	%	%	%							
12	%			%	%	%	%							
13	%			%	%	%	%							
14	%			%	%	%	%							
15	%			%	%	%	%							
16	%			%	%	%	%							
17	%			%	%	%	%							
18	%			%	%	%	%							
19	%			%	%	%	%							
20	%			%	%	%	%							
21	%			%	%	%	%							
22	%			%	%	%	%							
23	%			%	%	%	%							
24	%			%	%	%	%							
25	%			%	%	%	%							
26	%			%	%	%	%							
27	%			%	%	%	%							
28	%			%	%	%	%							
29	%			%	%	%	%							
30	%			%	%	%	%							
TOTAL														

COMPARISONS (q, r, s OF THIS REPORT—t OF LAST REPORT. SIMILAR FOR F AND S.)	q FRANKLIN DELIVERIES DURING PERIOD	r SENNETT DELIVERIES DURING PERIOD	s DELIVERIES OF BENNETT DURING THIS PERIOD	t FRANKLIN DELIVERIES THAT SHOULD HAVE BEEN MADE S·P	u

*—THIS FIGURE IS FOR MEASURING PURCHASING POWER OF THE COUNTY. IF GREATER THAN "G" PURCHASING POWER OF COUNTY IS LESS THAN AVERAGE. IF LESS THAN "G" PURCHASING POWER OF COUNTY IS GREATER THAN AVERAGE.

Fig. 4

the basis of the data collected in making territorial analyses. The quota formula which is now being used by this concern is probably not final and is very likely to be changed in the light of later investigations. The chief interest lies in the fact that definite study is being put on the subject and that intelligent and intensive effort is being made to apply scientific methods to automobile merchandising.

This brief resume of the work being carried on at Franklin does not in any sense pretend to constitute a well-rounded discussion of the problems of merchandising analyses which now confront the automobile industry. It is simply presented as containing certain general lines of thought and certain specific, though loosely correlated, ideas which should be of value to others in considering the problem. The complete story on this subject cannot yet be written, since the analysis of the factors involved and the study of the detailed phases of the problem are as yet limited in scope and practice.

The chief significance of this department, perhaps, is the fact that it illustrates the way in which some manufacturers have recognized the need for quantitative merchandising data. The growing interest and activity in this phase of merchandising is an important factor in insuring steady progress for the industry.

The recent questionnaire sent to car owners by the N. A. C. C. is an additional step in the right direction and furnishes another indication that manufacturers are taking an active interest in gathering such data. The benefits which the Franklin company have already derived from the comparatively limited research which has been done is also an encouraging sign. It may encourage similar work in other parts of the industry and thus lead to the collection of that mass of specific and quantitative data upon which sound merchandising policies for the industry can be built.

The value of such information, when thoroughly analyzed and correlated, will naturally reflect wider uses in connection with design and production plans and problems. It is important, however, to refrain from considering partial results as final. When temporary plans are made on the basis of partial results, that fact should be fully recognized and such plans and methods should not be allowed to grow into traditions.

A BILL now before the Spanish Chamber provides for an expenditure of 648,000,000 pesetas on roads and bridges, 493,000,000 for the repair and upkeep of main roads, 157,000,000 for local roads, 900,000,000 for hydraulic works, 60,000,000 for lighthouses, etc., 110,000,000 for agricultural establishments and machinery, and 44,000,000 pesetas in connection with the mining industry.

French Manufacturers Turn to Medium-Priced Cars

Many French automobile manufacturers, previously producers of high-priced models, are about to take up the production of cheaper and more economical cars. Panhard-Levassor is expected to bring out new model with very small Knight engine, while Peugeot has in preparation a small rotary valve engine. Use of overhead valves increasing.

By W. F. Bradley

SALES revived during June and July in the French automobile industry, but have dropped off for August, and are not expected to pick up again until after the fall shows. All factories are now working on the new or modified models which will be revealed to the public at the Paris show, scheduled for Oct. 5.

Speaking generally, all firms are getting down to smaller and more economical types. A few of the factories having started out after the war with medium size cheap cars will round off their production with a high class model, but in a greater number of cases firms having started with costly types will take up the production of cheaper and more economical cars. Among those coming into this category are Hispano-Suiza, Voisin and Delage, all of whom catered in 1920 for the luxury class only. Panhard-Levassor is expected to bring out a car with the smallest Knight engine ever built, the bore being only 2½ in. Peugeot is preparing a small rotary valve engine.

There will be a big increase at the next show in overhead valve engines, many of these having the camshaft in the basechamber, the valves being mounted in the detachable head. This design is preferred because of the cheapness of construction compared with the overhead camshaft. There will be an increased number of three-speed gearboxes; magneto ignition will lose a certain amount of ground, and four-wheel braking systems will gain. Cyclecars are receiving a lot of attention, but the big movement will not be for next year. Although the old prejudice against straight side tires is dying, there are no indications that Continental makers will adopt these tires as standard for next year. The change, when it comes, will at first be gradual, and it is premature to expect even the beginning of it for 1922.

The Brasier factories, both in Paris and at Grenoble, have been closed and it is doubtful if they will be reopened. This firm, which is one of the oldest in France, increased enormously in importance during the war, and had to erect a special factory at Grenoble for the production of airplane engines. Conditions have been very unsatisfactory since the Armistice, and notification of the winding up of the concern is expected daily.

Peugeot announces a considerable increase in sales during the past four months, the turnover being on a steadily increasing scale and the month of July breaking all records since the company existed. For the Paris district alone the sales were 3,180,000 francs for the month of July. Production at present is 700 automobiles per month, as follows: 400 10 hp. cars, 90 to 100 14 hp. models, 175 small two-seater Quadrilettes, and about 30 of the six-cylinder 25 hp. model. There is a growing demand for the cheap Quadrilette, and arrangements are in hand for an increase of this model only to 600 per month. Peugeot is building 250 motorcycles and 9000 bicycles per month. In the experimental department work is being completed on a 50-hp., two-cylinder, two-stroke engine which will run on any fuel from high-grade gasoline to crude oil, and will start up as quickly on heavy as on light fuel. This engine is at present being used for stationary work, but it is intended later to fit it into a 5-ton chassis.

Renault, in addition to passenger car production, is devoting a lot of attention to stationary engines and factory equipment. Among the new productions is a 10 hp. stationary engine running on either gasoline or kerosene, entirely enclosed for service in factories and workshops containing inflammable material, such as saw mills and wood working shops. A marine type heavy oil semi-Diesel 40 hp. engine is also in production, as well as a horizontal 80 hp. semi-Diesel. Renault is also devoting attention to small house lighting sets, the electric part of these being furnished by the S. E. V. Company, in which he holds important interests.

The Gobron Company, which has been dormant since the war, will shortly come on the market with a high grade six-cylinder valveless type. Berliet, while continuing passenger car and truck production, is devoting more and more attention to the repair of locomotives and the building of light railroad material.

Ballot, who up to the present has devoted himself to engines, announces that he is putting into production a series of 100 chassis exact duplicates of the two-litre four-cylinder machine with which Goux won third place at an average of 72 miles an hour in the recent French Grand Prix. This car is a four-cylinder of 69 by 130 mm. bore and stroke, of the same general design as the eight-cylinder models seen at Indianapolis, and is fitted with front wheel brakes. Deliveries will begin in November.

Bugatti is working on a high grade overhead valve eight-cylinder in line job, which probably will be out in time for the shows. An eight-cylinder in line is also in production at the Cottin-Desgouttes factory at Lyons.

Bayard-Clement and Lorraine-Dietrich, two firms which united forces about a year ago, have recently separated and are working independently. Lorraine-Dietrich is under the technical management of Engineer Barbarou, who has produced a six-cylinder overhead valve car of high quality but designed with cheap production in view. In addition, the firm is producing a limited number of two types of high grade costly cars.

Uniform Braking on Four Wheels

Editor, AUTOMOTIVE INDUSTRIES:

We have been following, with considerable interest, your articles in discussion of brakes, particularly the article on Four-Wheel Brakes in your annual engineering number, together with the letters accompanying it, and your recent article on Brake Lining Tests.

The trend is, apparently, in the direction of four-wheel brakes, and any engineer who has driven a car at a reasonably high speed on a rough down grade appreciates the tremendous advantage of four-wheel brakes, enabling quicker stops, smoother stops and less of that vibrating chatter of the rear axle and sliding of tires that are so noticeable with two-wheel brakes on rough hills.

In your article on Brake Lining Tests at the Bureau of Standards, Mr. Carson, of the Johns-Manville Company, points out one of the big factors that has restricted the development of four-wheel brakes on American motor cars—that is, the variation in co-efficient of friction of the brake lining, which makes it impossible with present braking systems to get even braking on four wheels without continual adjustment.

American designers know their public very well and know that the average owner would never give this adjustment proper attention; but will, instead, complain of the car when he suffers from the effects of his carelessness and neglect. This fact, combined with the cost of the average four-wheel system, with its complicated equalizers, has been, we believe, one of the reasons why four-wheel brakes have not been more widely adopted by American designers.

This company has made a very extended study of brakes and has come to the conclusion that the only manner in which to safely handle the high speeds of modern automobile practice—both trucks and passenger cars—is to brake on all wheels. The difficulty of equalizing—not the pulling on the brake rods but the actual braking—resulted in our devising a system of self-adjusting brakes for automobile use; that is, brakes in which the friction between the drum and the shoe regulates itself, thereby assuring absolutely uniform braking on all wheels; and, if combined with an automatic take-up on the brake rods, the elimination of any attention to the brakes from the time the car leaves the factory until it is necessary to reline the shoes.

H. L. HIRSCHLER, Manager,
Horace Remote Control Co.

Testing Aluminum Castings

Editor, AUTOMOTIVE INDUSTRIES:

The article by Dr. Walter Rosenhain, printed in your issue of Aug. 4, presents a controversial issue which is always associated with a preparation of test specimens. The Engineering Standards Committee of Great Britain specifies that aluminum test bars shall be cast in a permanent iron mold and that the mold shall be heated. Dr. Rosenhain evidently indorses this view. On the other hand, the American Society for Testing Materials and most bodies with which the writer is acquainted, who exercise the function of specifying for test specimens, call for the bars to be poured in green-sand molds.

It is certainly the carefully considered opinion of most engineers on this side that the sand-cast coupon will, in spite of superficial judgments to the contrary, prove to be more consistent in its results than the specimen cast in a metal mold and most particularly is this true of aluminum. Only those who are intimately associated with the business of producing aluminum castings in iron molds know the multitude of factors which modify the product. Such influences as the temperature of the mold and the rate of pouring will seriously affect the quality of the casting, and it is no doubt this reason which has led standardizing committees in the United States to adopt the sand-cast test bar as the standard.

In spite of what Dr. Rosenhain says to the effect that a designer is not apt to be misled by the higher qualities arising from a permanent mold casting, I feel it would be open to criticism if out of two pretty good methods of testing, we were to choose deliberately the less conservative one.

In the light of our present experience, therefore, the best form of test bar for aluminum alloys is certainly the one cast in the green-sand mold, designed with a medium-sized riser at one end and pouring gate on the other, the mold inclining upward at a very small angle from the gate to the riser. ERNEST V. PANNALL.

Poor Batteries an Economic Waste

Editor, AUTOMOTIVE INDUSTRIES:

I have read the editorial in the AUTOMOTIVE INDUSTRIES of July 21st, entitled, "What's the Difference." It was very good and to the point and I am glad to see that this question is being taken up and discussed because there is a big economic waste in the unnecessarily short-lived storage batteries which is coming out of the user's pockets, as was indicated in the editorial.

Observation has shown me that overcharging a battery shortens its life more than anything else.

Some years ago I developed a system of taper-charge-regulation that would overcome this deteriorating fault. This method of regulation and the adoption of a battery of proper size for the work would give a system that on the average would make the battery last five or six years.

I compliment you for tackling this question.

VINCENT G. APPLE, Proprietor,
Vincent G. Apple Laboratories.

THE Electrical Research Association of Great Britain is actively interested in furthering the manufacture and use of electrical insulating materials made from synthetic resins and varnishes and having the well known heat resisting characteristics associated with some of these materials. Leading manufacturers and users of the raw materials and finished products are co-operating.

The Human Element as Related to Standardization and Uniformity

A standard is something as nearly accurate as we can secure, by which similar processes may be measured. Uniformity implies a repetition of the same process. The effect of uniformity upon the human element in production must be considered or false premises may be established.

By Harry Tipper

A LITTLE discussion has been occurring in the Forum of AUTOMOTIVE INDUSTRIES in regard to standardization that has interested me because the question of standards has been brought up a great many times in connection with the efficiency of industry.

We are apt to think that we have a very clear and logical terminology in connection with our scientific applications, particularly in engineering, chemistry and similar branches. When definitions are sought, however, we begin to discover curious differences in these definitions as they are produced by the various authorities. The terminology indicates a degree of inexactitude not quite consistent with our general understanding and leading to a good deal of misconception in the discussions that occurred.

In this question of standards and standardization there seems to be a confusion between arriving at a standard and merely agreeing upon a uniformity. There is a vast difference between the two and a proper discrimination is necessary if we are to proceed along the right lines and to correct our past mistakes as we go along with future development.

A standard is something as nearly accurate as we can secure, by which every similar process can be measured in an endeavor to determine its accuracy. It is an ideal to which we expect to work as nearly as the practical limitations make it possible. This standard has nothing to do with the method of development, or the uniformity of the process. It makes the result as nearly interchangeable as the approach to the standard insures its accuracy, but it does not argue a similarity of method or process or a uniformity of development.

Uniformity, on the other hand, implies a repetition of the same process without any variation or change and without any reference to the ideal situation. The uniformity of the method may be the poorest means of arriving at a high standard, if the standard is difficult and requires a large measure of delicate understanding.

The object of all endeavor is to arrive at a high standard, one more accurate or closer to perfection.

The uniformity of the method is not dictated by the necessity of reaching a high standard, but is made necessary by the employment of machinery subdividing the work. Under these circumstances a uniformity in similar operations is necessary to the more rapid production.

No one would say that the standard of accuracy reached by the old instrument maker was any less than the standard reached by the producer of instruments to-day. In fact, the skilled instrument maker of the craftsman period produced instruments of a higher degree of effectiveness than anything we have been able to produce under present conditions.

There are few men who can make a standard of mathematical measurement so accurate that it is fit to be used as an ideal by which to measure other work. These instrument makers in the past worked by hand. They did not use uniform methods of producing their instruments. Nevertheless, they reached a high standard of efficiency in the result.

As soon as one man was told off to make a small portion of the instrument and to confine his attention to that only, uniformity became necessary in order that the pieces he made should be interchangeable, permitting of their use in the assembly of any instrument.

Standardization as an ideal of efficiency and accuracy is a very important element in the improvement of production.

Uniformity of operation is only important as it serves the conveniences of industry, and events may prove it to be detrimental if it is carried too far in its development.

The continued improvement in industry is dependent upon the continued discovery of more efficient methods of production, more readily adaptable to the particular problem of production. This improvement depends, therefore, upon the alertness of the human being and his continued incentive for alertness in connection with his work.

Uniformity may destroy that capacity from complete disuse or so weaken it from lack of necessity that it becomes practically non-existent.

Furthermore, skilled labor must retain a fair degree of adaptability in order that the laboring population should be adapted to the requirements of the various industries under any ordinary conditions. Machinists would not be skilled at any other trade except machining, but they ought to retain within that trade a certain measure of adaptability in order that the varying requirements of employment in the different branches of machinery may be taken care of by the flow of this more or less flexible skill.

Uniformity has a distinct tendency to remove this adaptability so that the worker is unable to become skillful in any except the operations to which he is accustomed.

It is under these circumstances labor becomes more and more inflexible and unemployment a more serious problem because of this rigidity.

In Great Britain where complete employment of all the working population is a rare condition, the increasing rigidity of labor in its specialization is a very acute problem and adds its difficulty to the other elemental troubles in the situation.

Only the supervisors who have struggled with the rearrangement of operations of a highly repetitive character are aware of the unbelievable specialization which comes out of this repetitive work and which makes it almost impossible for the workers to adapt themselves to any kind of change.

The question of a standard is a different one from this question of uniformity of operation and must be approached from a different standpoint.

The designing of the mechanical appliances must, in the course of time, take account of the difficulties arising out of the uniform methods of operation and the inaccuracies that may result from the confusion between the uniformity of method and standardization of result.

The costs of manufacturing are affected themselves to a very great degree by the increasing rigidity of labor arising out of this uniformity of operation.

Some time ago four men interested in large manufacturing concerns were lunching together. One of the men was an important executive of a company which controlled the majority output of that field. They had just bought out a new small company. They were confronted with the problem of discontinuing the special brand, the property of the company they had acquired, and absorbing it into their general brand, or maintaining it as a special brand and selling it through their own organization. Incidentally to this problem the men remarked that if they absorbed it into their general brand, they would be obliged to charge more for it. This remark interested me very much. I said, "How is it that with all your facilities, ability to buy in quantity, special machinery, and other items of production improvement, you are unable to manufacture as cheaply as a small competitor?"

His reply was, "I don't know the exact reason, but I am beginning to suspect that we get less efficiency out of the individual."

Flexibility of labor is one of the elements of efficiency.

No factory can be so balanced in its work at all times that there is an equal necessity for labor in all departments and that the business of each department occupies fully the time of the workers to an equal degree.

Some flexibility of the workers' time is necessary if the costs are to be kept down, even in this respect; although the biggest element of cost is the tendency toward the establishment of a minimum pace and the fatigue arising out of the monotony.

Interchangeability is necessary to modern production to a considerable degree. A fair degree of specialization is necessary, but when those elements begin to reach a rigid uniformity of operation, system and method, supervisors and workers are inhibited by that uniformity so that they become rigid in their capacity and narrowly specialized in their thought, with the result that alertness is destroyed, flexibility of thought and operation are limited, and the general efficiency materially lowered.

To reach a high standard of manpower efficiency is just as important as to reach a high standard of product efficiency. Both of them should be measured and uniformity of operation should be considered in its proper place as a convenience of development depending for its value upon its reaction in connection with both these standards.

Effect of Dilution of Charge by Spent Gases

AFTER a long study of the effects of fuel economy of automobile engines, the Bureau of Standards' experts have concluded "that the dilution of the charge by the spent gases remaining in the clearance volume makes it impossible at low throttle to employ those air-fuel ratios which if they could be fired would yield the maximum efficiency. If the exhaust gas that is present during normal operation forms a barrier to the use of high-efficiency mixtures, then surely the designer ought to avoid any devices for adding still more dead gas to the charge."

In adding exhaust gas to the induction system, a higher thermal efficiency has been the goal. Some investigators have found that increasing the amount of inert gas in the charge tends to prevent fuel knock and hence enables a high compression ratio to be employed. Since thermal efficiency depends upon the expansion ratio, which in the conventional engine equals the compression ratio, it should be higher with a higher compression ratio.

Full throttle tests apparently show such to be the case and from these results it has been concluded that the addition of exhaust gas will be even more beneficial at part throttle. It is assumed that under such conditions a decrease of power is of no consequence and that the heat of the exhaust may be of considerable aid in vaporizing the fuel. Since in service the automobile engine is operated at part throttle most of the time, it is under this condition that economy of fuel consumption is most important. Therefore, the Bureau has given considerable attention to the effect of admitting exhaust gas under such circumstances.

Nearly all investigators have noted that under light loads the engine will not fire mixtures having as high a rate of air to fuel as that which gives the best economy at higher loads. This is probably because the inert gas with partially opened throttle forms so large a proportion of the total charge. The compression pressure is, of course, also too low and many experimenters have ascribed the poor efficiency to this cause.

To prove that the proportion of the exhaust gas is the predominant influence, an engine partly throttled was operated with the leanest air-fuel ratio with which it would fire regularly. The engine was again operated with a sufficient amount of exhaust gas admitted with the charge to reduce the engine power to the same value as had been obtained in the first test by throttling. Although the pressures in the latter case were considerably higher than before, not nearly as high an air-fuel ratio could be fired and lower thermal efficiency was the result.

A RECENT investigation conducted by the Bureau of Standards had for its purpose the demonstration of the structural changes which occur in hardened steels upon tempering. It has now progressed far enough to show that there is a decided change (best seen in high-carbon steels) brought about by tempering at approximately 240 deg. C.

In other cases the changes which occur are relatively inconspicuous and this accounts for the surprising lack of data of this kind in the literature, although an immense amount of work has been done upon the subject of hardened and tempered steels.

AUTOMOTIVE INDUSTRIES
The Automobile
Reg. U. S. Pat. Off.

PUBLISHED WEEKLY
Copyright 1921 by The Class Journal Co.
Vol. XLV Thursday, September 1, 1921 No. 9

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Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; A. C Pearson, Treasurer; Fritz J. Frank, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

Convenient Crankcase Drains

ONE of the oil companies has called attention to the need for more convenient oil drains on crankcases. The present provisions for draining the oil on the majority of cars are certainly very unsatisfactory. Not only is the job tedious and very dirty, so that the operator instinctively shrinks from it, but in the case of cars having splash lubrication it is impossible to drain the splash troughs in which a good deal of the sediment collects. In earlier designs of engines having oil pans with the splash troughs cast in, drain cocks were occasionally provided for each trough. A boss was cast through the oil well from the lowest point of the splash trough. This was drilled and tapped and a drain cock was then screwed in. But later the cast oil splash troughs were practically discarded and sheet metal troughs substituted therefore. These troughs are pressed in a plate which is inserted into the lower half of the crankcase, and it is therefore impossible to drain them through the bottom of the crankcase. All sediment collecting in the troughs remains there until the lower half of the crankcase is removed for the purpose of adjusting the bearings. Of course, as long as the engine is in operation the oil in the splash troughs is kept constantly stirred up and any solid particles held in suspension by it have hardly time to separate out, but sedimentation will certainly occur while the engine is standing.

As long as splash lubrication is used in conjunction with sheet metal splash troughs it will be almost impossible to provide means for draining the troughs. The remedy would seem to be to discard splash lubrication altogether, and engine design is now headed in that direction. The problem of providing convenient means of draining the sump remains, however. At the present time, instead of a mere plug, a plate is often provided to which the oil strainer is secured. As soon as one or two of the nuts holding the plate in place are loosened the oil begins to drip, if not to run, and the person removing the plate usually gets a good deal of oil on his clothing.

The solution of this problem is difficult. An ordinary drain plug, operated through an extension handle from the side of the car, would hardly suffice, as the drain passage would be too small and little of the sediment would be carried along by the flow of oil. Poppet valves opened and closed from the side of the crankcase would meet the requirement of easy operation and rapid flow, but it is hardly likely that an oil-tight closure could be effected with them, as particles of grit would be almost sure to adhere to the surface of the valve and prevent good seating.

Careless Wiring of Cars

CAR manufacturers whose product has the best reputation in the trade as well as some whose product is not so well thought of are coming to understand that a car which is free from trouble caused by careless or indifferent work in production or assembly, is a great asset, while the worst of "black eyes" may result when the reverse is true. Thousands of repeat orders come with little energy to the maker whose car has a well-founded reputation for dependability, but the sales resistance to a product which continually calls for the attention of the repairman is greatly increased. There can be but little question that time and money spent in overcoming resistance of this kind might far better have been spent in eliminating the source of trouble in the first place.

One prolific source of trouble in many makes of cars to-day is due to poorly laid out and carelessly executed jobs of wiring for the electrical units. Grounds, short circuits and loose connections occur at times in the best of jobs, but they are much more frequent in the job which is indifferently done. In general wiring should be enclosed, but still left as accessible as possible. In every case it should be well supported to prevent abrasion from vibration, and so located as to be protected from oil and other mediums which tend to cause the insulation to deteriorate.

The average garage mechanic is far from adept in locating electrical troubles, and some of these troubles have often puzzled the most proficient electrician. An

intermittent ground or short may require many hours to locate, and sometimes a number of trips to the shop before the difficulty is finally run down and repaired. In the mean time the owner, who understands little or nothing about electrical apparatus is chafing and impatient because his car is laid up, perhaps when it is only a few weeks old, and the things he thinks and often says about the manufacturer are hardly to be construed as good advertising material.

Most of such difficulties can be overcome by:

1—Seeing that the wiring layout and the materials used are the best possible under the conditions imposed as to price, etc.
2—That the workmanship is first class.
3—That rigid inspection and check tests are applied before the job is approved.

In the performance of the modern car so much depends upon the proper functioning of the electrical equipment that care in seeing that it is well selected and installed will assuredly pay the car builder who gives it requisite attention.

The ZR-2 Disaster

THERE can be little doubt that the fatal disaster to the ZR-2 at Hull, England, last week will prove a great setback to commercial aviation. The ship was the largest of her kind ever built; she had apparently passed successfully through her preliminary trials and was getting ready for her trip across the Atlantic when the accident occurred. The great loss of life is to be deeply deplored, the more so because among those killed were some of the most experienced men in England and America in the art of operating dirigibles. The heavy material loss involved in the accident also will act as a deterrent to enterprise in the development of commercial aviation.

From the accounts of eye witnesses and survivors it is fairly obvious that the primary cause of the disaster was insufficient rigidity of the girder structure. It may seem surprising that an accident due to this cause should have come only after the ship had been in the air for 35 hours. The probable explanation is that up to just previous to the time of the accident the big ship had never been operated at full power. From all accounts at the moment of the accident the engines were being "let out," and the controls were being tested. Now, the girder structure of a rigid type of airship is naturally subjected to the greatest strains when either the elevators or the rudders are set at sharp angles and the engines are simultaneously going at full speed. There had been reports of the development of structural weaknesses previous to the accident, but it appears that reinforcements had been made and it was thought that a sufficient degree of safety had been attained, which unfortunately proved incorrect.

Many of the reports had it that a gasoline tank exploded, but it is much more likely that the explosions which occurred were due to the hydrogen. If the breaking of the girder work occurred before there was an explosion, as seems to be the case, the gas bags containing the hydrogen were rendered very vulnerable, and once one of these bags was ripped open, ignition of the escaping gas by flame from the exhaust would be almost inevitable. Liquid gasoline cannot explode, and there is only comparatively little gasoline vapor in the fuel tanks at any time. The tremendous force of the explosion further supports the assumption that it was the hydrogen that exploded.

During the war a great deal was written regarding the possibilities of helium gas for use in dirigibles, and much money was spent in experimental work on the extraction of this gas from natural gas, both in this country and in Canada. While a non-combustible buoyant gas would be of particular value in war time, because it would render a dirigible practically immune to attack with incendiary bullets, it would also greatly add to the safety of peace time air travel. Had such a gas been used in the ZR-2 it would not have prevented the accident, though it is conceivable that under the conditions under which it occurred it might have considerably reduced the number of fatalities. Still, if the failure of the hull had occurred on the ocean trip—and the ZR-2 was intended mainly for ocean cruises—the final result would probably have been substantially the same with a non-combustible gas.

There is one lesson of the disaster that should not be lost on designers and promoters of enterprises connected with dirigibles. For the sake of safety the limits of size and flying range should not be advanced too rapidly. Weakness in the girder structure may be ascribed to the desire to obtain the greatest possible buoyancy, so that the ship would have a large flying radius and could carry a large crew and cargo. While the transatlantic flight was shown to be possible by the trip of the R-34, it must be remembered that that vessel made the westward trip with only a very narrow margin in fuel capacity—so small, in fact, that a wireless call for aid was sent out. It was obvious after the trip that for safety under all weather conditions a greater relative fuel capacity was necessary, and with a ship of the same displacement this could be obtained only by lightening the hull or other parts which means a lower factor of safety structurally, unless the state of the art is materially advanced. A more gradual increase in flying range, together with extensive use of all types developed before undertaking new and more ambitious designs, would result in reducing the risks that must of necessity be incurred in this line of work.

The Unemployment Conference

THE proposed conference on unemployment announced by Herbert Hoover will be followed with great interest by automotive manufacturers. That a certain moral obligation rests upon manufacturers in this connection is rather generally recognized. Ways and means of meeting that obligation in fairness and justice to all concerned are not readily visible.

If the proposed conference can throw any light upon this phase of the question it will be performing an excellent work.

Improvement Seen in M. A. M. A. Survey

Prospects for Fall Given in Analysis

Industry Actually Moved Forward in Face of Normal July Slump

NEW YORK, Aug. 30—During July the automobile industry not only held its own in the face of the normal seasonal slump, but actually moved forward. The basic betterment of underlying conditions, as revealed by a searching analysis of current financial and commercial factors, gives promise for continued improvement, which should be more marked in September and October.

This is the significant feature of the regular monthly survey made public today by the Motor and Accessory Mfrs. Association.

The concentrated experience and precise financial reports of more than 300 representative manufacturers of units and equipment for passenger automobiles and motor trucks form the basis for the association's statistical charts.

Parts Buying Increases

Purchases of parts, units and accessories by the vehicle builders increased 1¾ per cent during July over June. Further encouragement was seen in the fact that the totals of notes outstanding decreased almost 8 per cent. The only unfavorable factor indicated by the month's figures was an increase of 10 per cent in the totals of past due accounts reported.

The month-by-month percentage changes, beginning last January, follow:

Month	Per Cent Change*	Per Cent Change**	Per Cent Change***
January..	.....	.....	.....
February	66.15 Inc.	17.07 Dec.	39.08 Inc.
March ..	93.30 Inc.	16.57 Dec.	16.38 Dec.
April ...	32.93 Inc.	4.49 Dec.	5.94 Inc.
May	00.13 Inc.	15.64 Dec.	16.77 Dec.
June	15.19 Dec.	4.79 Inc.	10.37 Dec.
July	1.68 Inc.	10.79 Inc.	7.90 Dec.

*Purchases of parts, units, equipment, etc. by automobile passenger car and motor truck makers from 300 parts and accessory manufacturers by months — per cent change.
**Totals of past due accounts reported—per cent change.
***Totals of notes outstanding — per cent change.

Managers Optimistic

Credit managers and general executives of parts manufacturing concerns are now inclined to take a more optimistic view of the present situation and immediate prospects, and they point to releases on deferred shipments, new orders and better collections to justify their constructive outlook. The vague feeling of alarm and discouragement which was evident in some circles several months ago has been largely eliminated.

"We are too busy making business to have time for the blues," remarked one official in touch with many of the largest concerns in the industry.

The prevailing sentiment in the automotive field is reflected by the following typical statements, reported verbatim, at credit interchange group meetings held within the last fortnight:

All Reports Favorable

"Business with us is somewhat better than it has been for some little time; in fact, we notice quite a substantial improvement with the reduction in prices on popular priced cars, although our sales are not anything like what they were a year ago. We have business booked now going until Sept. 15 or longer."

"Our sales have improved gradually from April 1 up to the present time; in fact, our sales for the month of July were very good and they are still holding up. June and July exceeded our sales for the same months last year. Of course it is true that our sales did not amount to a great deal in those months last year. Our collections have also been very good. We were a little doubtful about August, but were very much gratified up to yesterday. So our business, really, is showing a decided improvement."

"Our business this year in our products has been, of course, not anywhere near what it was last year but July has been much better than June. In fact June took quite a slump under May; but July was some better than either May or June. Collections are good as a whole. Some small accounts are feeling the strain of their own poor collections; on what we term miscellaneous business, collections are hard to get. We have had to take weekly payments and do a lot of things that we didn't a year ago. However, the losses, handling it in that way even, have been small. So the little fellow apparently has been able to make some collections and do some business; in other words, he is getting a living but probably not much more."

Appoint Committees for M. A. M. A. Convention

NEW YORK, Aug. 30—Committees for the "Back to Normal" Credit Convention of the Motor and Accessory Manufacturers Association, were announced to-day by General Manager M. L. Heminway. The Detroit Committee of Arrangements will consist of: C. W. Dickerson, (chairman), vice-president, the Timken Detroit Axle Co.; E. R. Ailes, treasurer, Detroit Steel Products Co.; M. A. Moynihan, secretary, Gemmer Mfg. Co.; William Hendrie, secretary, Detroit Gear & Machine Co.; Thomas M. Simpson, credit manager, Continental Motors Corp.

The honorary committee, consisting of the association's board of directors in Detroit, has also been appointed. These will comprise: A. W. Copland, (chairman), president, Detroit Gear & Machine Co.; C. H. L. Flintermann, vice-president, Detroit Pressed Steel Co.; E. P. Hammond, president, Gemmer Mfg. Co.; F. Glover, vice-president, Timken-Detroit Axle Co.; G. W. Yeoman, vice-president, Continental Motors Corp.

Court Order Removes Kelly Tire Receiver

Bankruptcy Affairs Again Left in Hands of Bridgeport Bank and Attorney

BRIDGEPORT, CONN., Aug. 30—Former Congressman Augustine Lonergan of Hartford, named receiver of the Kelly Tire & Rubber Co. of New Haven three weeks ago, has been removed by an order filed in the United States District Court in that city by Judge Edwin S. Thomas. The bankruptcy affairs are left, as they formerly were, in the hands of Attorney Albert H. Barclay of New Haven, and the City National Bank of this city, who were appointed by the Superior Court of New Haven County.

The appointment of Mr. Lonergan as receiver, it is explained, was made without notice to the corporation or the State receivers, the latter appearing before Judge Thomas at Norwalk the 22d and, through counsel, moving to vacate the appointment on the grounds that there was no legal reason for Mr. Lonergan's appointment. The State receivers, through counsel, set up that the appraised value of the company is more than $540,000 and the indebtedness less than $200,000. They also allege that the parties who brought the involuntary petition in bankruptcy are not creditors but four stockholders with small holdings, that the company is not insolvent and a receiver in bankruptcy would interfere with the adjustment of the corporation's affairs.

Former Congressman Lonergan was appointed receiver of the Kelly Tire & Rubber Co. by Judge Thomas at South Norwalk, Aug. 4. The appointment was made on petition of Benedict M. Holden of the Hartford law firm of Holden & Peck, representing the stockholders' protective committee, consisting of Nathan D. Prince, vice-president of the Hartford-Connecticut Trust Co.; C. L. Holmes, president of the Waterbury Trust Co., and John T. Manson, president of the First National Bank of New Haven.

TOOL SALVAGE TRADE GROWS

DETROIT, Aug. 30—Canadian Tool Salvage Co. has been organized in Windsor, Ont., to operate as a branch of the National Grinding Co. of this city. The company specializes in the reclaiming of worn down cutting tools used in the automotive industry. The Detroit company has been in operation over a year and is extending its facilities to meet increased business demands. Affiliated in the company are H. M. Ash, W. G. Cook H. W. St. John and A. J. Moquin.

Motor Cars Used on 30.7% of U.S. Farms

Survey Also Shows Truck Popularity

Per Cent Has Increased Since Census Taken 18 Months Ago Big Gain Since

WASHINGTON, Aug. 30—Statistics compiled by the Bureau of the Census, Department of Commerce, as of Jan. 1, 1920, show that 30.7 per cent of farms in the United States have automobiles. The data proves the utility of the motor vehicle, for it shows that of the 1,979,564 farms reporting there were 2,146,512 automobiles in use Jan. 1, 1920, or 332.9 automobiles per 1000 farms.

The Federal figures also show the growing popularity of motor trucks and tractors on farms. About two farms out of every hundred in the United States as a whole possess motor trucks. Motor trucks were reported on 131,551 farms in 1920, making a total of 139,169 trucks in use on that date. Pennsylvania led the field with 9372 motor trucks in use on farms; New York, with 9259; Iowa, with 8910; Ohio, with 7319; Nebraska, with 6548; California, with 6416, and Illinois with 6154.

Automobiles were reported by more than one-half of the farms in eight states, namely, Nebraska, Iowa, South Dakota, Kansas, Minnesota, North Dakota, California and Illinois.

The following States reported more than 100,000 automobiles on farms in 1920: Iowa, 177,558; Illinois, 139,090; Ohio, 128,384; Kansas, 111,055; Minnesota, 107,824; Texas, 105,292; Nebraska, 104,453, and Indiana, 102,122.

Figures Over Year Old

It must be remembered that these statistics were gathered as of Jan. 1, 1920, and more than 18 months have elapsed since the compilation. Therefore, the data cannot be considered as indicative of present conditions, for enterprising salesmen have conducted active campaigns in this period and as a consequence thousands of machines have been added to farm equipment. Neither can the figures be regarded as comprehensive, because they are passed on only 30.7 per cent of all farms, and as reports have not been received from an impressive majority the figures cannot be used in any accurate determination of motor vehicle sales.

The record of the Bureau of the Census shows that one farm out of every 28 owns a tractor as of Jan. 1, 1920. There were 246,139 tractors in use on 229,334 farms on the census date. More tractors were in use in Illinois than in any other State, as statistics show 23,102 tractors in that State, with Iowa next, possessing 20,270 tractors; Kansas, 17,177; Minnesota, 15,503; California, 13,852; North Dakota, 13,006; South Dakota, 12,939, and Nebraska, 11,106. These eight States reported more than one-half of all tractors on farms in the United States. For the country as a whole, there were 38.2 tractors for every 1000 farms in 1920, and for the eight States above mentioned, taken together, 106.8 tractors for every 1000 farms.

The States with the highest percentage of all farms reporting tractors in 1920 were as follows: South Dakota, 16.3 per cent; North Dakota, 15.2 per cent; Montana, 12 per cent; California, 10.3 per cent; Kansas, 9.8 per cent; Illinois, 9.3 per cent; Iowa, 9.1 per cent.

Withdraw Ten Headlight Devices from State Law

BRIDGEPORT, CONN., Aug. 30—Withdrawal of ten headlight devices from the Connecticut-approved list, under the authority granted at the last session of the legislature, was announced recently by the motor vehicle department at Hartford and through its representatives here. The devices placed under official ban by this latest ruling, effective Jan. 1, 1922, are: Ford Green Visor, Nevablind, Mac Ne Glare Bulb, Raydex (type B), Onlee, Full Ray, Deflector, Safetee, Roadlight, Dimmre, Homemade Device. The Warner Pathfinder, Dillon (old type) Morelight, Clamert (old type) with frosted glass front and plain glass fronts with frosted bulbs are listed as illegal devices, "which are not approved and can not be used in this State."

Announcement is also contained in a comprehensive booklet on "Regulations Governing the Use of Headlights on Motor Vehicles," which has been prepared by the motor vehicle department for general distribution. Only advance copies have yet been given out.

Mohler Heads Motor Division of Chamber

MEXICO CITY, Aug. 17 (*By Mail*)—A. B. Mohler, of Mohler y DeGress, has been named chairman of the new Automotive Division of the American Chamber of Commerce here. The chamber reports that the division is progressing rapidly and that definite results for the automotive industries should be expected from it. Chairman Mohler's firm is the Mexico City agent for Overland, Willys-Knight, Chalmers and Cadillac cars. The chamber reports that the total value of automobiles and parts bought by Mexico, as shown by the Governmental statistics, from the United States were valued at 15,162,266 pesos for the fiscal year ending June 30.

Denby Refinancing Plan Agreed Upon

President Says New Capital Will Place Company in Good Position

DETROIT, Aug. 30—Stockholders of the Denby Motor Truck Co. agreed yesterday to the refinancing program outlined by directors, by which $300,000 first mortgage bonds and $650,000 first preferred stock will be issued to meet current liabilities and to provide working capital. The new stock issue will bring the company's capitalization to $1,400,000. None of the stock will be offered at public sale.

In a statement to stockholders, 85 per cent of whom were represented at the meeting, President A. S. More said the new capital would place the company in an advantageous position to seek new business. Operations at the factory will be increased in September to meet demand for the ¾-ton and 1½-ton models.

The $300,000 first mortgage bonds are five-year 7 per cent, $100,000 Class A and $200,000 Class B. The new stock is 8 per cent non-accumulative, par $10. All of the new stock and bonds, except for the $100,000 Class A bonds, will be used to meet creditors' claims, the stockholders waiving their rights to subscribe to the new issue.

General Motors Export Back in Old Quarters

NEW YORK, Aug. 29—General offices of the General Motors Export Corp., which has been for some months at 120 West Forty-second Street, will be moved within the next few days to the former location in the General Motors Building at Fifty-seventh Street and Broadway. Four floors of this building, it was stated, have been vacated by the Chevrolet group of General Motors, thus leaving free the space for use of the export company. The export company reported, coincident with the announcement of the removal, that foreign sales were showing somewhat of an increase and that a good volume of business was expected not later than the beginning of the new year.

DUESENBERG IS BUSY

INDIANAPOLIS, IND., Aug. 30—The Duesenberg Antomobile and Motor Co., Inc., has progressed so far with its plans that it is about ready to close contracts with some distributers in the metropolitan territory. The price of the Straight Eight has not yet been definitely fixed, but it is understood that it will be around $6,000.

Ford's Power Plant May Be Abolished

Engineers Consider Transforming It Into All-Steam Plant—Seeking Economic Remedy

DETROIT, Aug. 30—The enormous power plant at the Ford Highland Park factory, long the pride of Henry Ford, is soon to be transformed from a gas-steam plant to an all steam plant, or is to be abolished entirely, Engineers, headed by William B. Mayo, are now determining the most economic method of handling the power situation.

The gas-steam plant has been in operation for over ten years and a point has been reached where gas-steam power is no longer as economical as steam power alone.

Two plans are under consideration. The first involves the junking of the producing gas plant and installation of additional steam boilers. This would cost approximately $2,000,000. The second plan is to eliminate the Highland Park power plant entirely and bring high tension power from the River Rouge, which would require an addition to the latter plant. This cost approximates $3,000,000.

There will be no interference with operations at the Highland Park plant while the power changes are under way. The Detroit Edison Co., which has a power house nearby, would furnish 90 per cent of the present peak power, which runs about 75,000 hp.

Detroit Trailer Has New Heavy Duty Model

DETROIT, Aug. 30—Detroit Trailer Co. has brought out a heavy duty semi-trailer capable of carrying a load of 50 tons, which it is now preparing to go into production. The semi-trailer was given a thorough trial last week and found fully practicable for the work designed. Several orders for first production were placed following the trial.

The semi-trailer departs from the conventional in that it has four wheels in line instead of two. This gives it a total tire surface of 48 in. and permits a load disposition of about 800 lb. per sq. in. Each of the four wheels are mounted on special Mansfield axles with radius rods on ball joints. Double spring action is provided.

Specifications of the semi-trailer, in addition to Mansfield axles and steel frames, call for Timken bearings and Detroit springs. List price has been fixed at $2,750 and the company regards the field for the new vehicle as unlimited. Through the use of the four wheels to carry the load, the trailer overcomes overloading legislation.

The new trailer was designed by J. B. Mansfield, president of the company, and patents covering all features have been applied for.

REPUBLIC OF BRAZIL PLACES TRAILER ORDER WITH DETROIT FIRM

DETROIT, Aug. 29—An order for fifty 5-ton trailers with combination steel and wood bodies has been received by the Detroit Trailer Co. from the Republic of Brazil for instant delivery. In addition, the company has received an order for 47 bodies for G. M. C. trucks, the latter order also for the Brazilian Government, being placed with General Motors, specifying Detroit bodies. The trucks and trailers are to be used for hauling cement into the interior, a distance of 250 miles.

The order is said to be the largest export order received in Detroit for some time, and is the largest trailer order of the year. Outlook in the trailer business is considered promising.

Seiberling Is Silent on Republic Rumors

AKRON, OHIO, Aug. 30—F. A. Seiberling, former Goodyear president, today said he had nothing to give out for publication upon his reported negotiations with C. H. Booth, receiver of the Republic Tire & Rubber Co. at Youngstown for rumored acquisition of the Republic plant.

It has been reported for some time that Seiberling planned acquisition of the Republic plant and the Marion Tire & Rubber Co. of Marion, Ohio, which with the Lehigh Tire & Rubber Co. of New Castle, Pa., and the Star Rubber Co. of Akron, would form the nucleus of a chain of rubber companies. Seiberling has assumed control of the Lehigh plant and it is now in operation. He has a large interest in the Star at Akron.

It is also reported that Seiberling interests will bid in the Marion plant if it is sold at receiver's sale on Oct. 3, as now scheduled by D. D. Grindle of Lima, referee in bankruptcy. Akron men are prepared, however, to meet with creditors and stockholders before the date of sale and offer them a plan whereby the company's bankruptcy can be relieved and high priced inventories utilized without heavy loss. Claims against the company now aggregate $600,000.

SEVERNS KNOX RECEIVER

MT. VERNON, OHIO, Aug. 30—F. W. Severns, former county treasurer, has been appointed receiver for the Knox Tire & Rubber Co. The petition for a receivership was filed by Edward Elford who claimed to have a mechanic's lien on the property for $6,754. Severns will continue operation of the plant under the direction of the court.

The plant has been running and will continue with possibly more men.

Defer Payments of Miller Dividends

Rubber Company Will Issue No Preferred Stock Checks September 1

AKRON, OHIO, Aug. 30—Miller Rubber Co. officials have announced that their preferred stock dividend due Sept. 1 would not be declared owing to a present book deficit. Owing to the uncertainty of business conditions officials of the company also say it will be impossible to indicate when payment of dividends can be resumed, advising that this will depend entirely upon the amount of business that can be secured at prevailing prices.

Since Jan. 1 the Miller Rubber has reduced its inventory sufficiently to reflect a reduction in total indebtedness from $8,676,000 to $2,400,000, of which $1,400,000 is owing to banks, according to a letter just issued to stockholders. Against this the company has accounts receivable of approximately $3,100,000 and $1,200,000 cash in banks. Neither of the indebtedness figures accounts for commitment losses, which have been reduced about $400,000, it is stated.

During the first five months of the current year Miller business was 55 per cent of the corresponding period of last year, but since June 1 business has revived, officials claim, and now averages 82 per cent of the corresponding period of last year, at reduced prices.

"In accordance with the requirements of the preferred stock contract, the directors contemplate purchasing in the open market, so far as is deemed advisable, the amount of stock which the company is required to redeem during the current year. Funds for this purpose can be taken from the assets of the company independent of a surplus account. In fact, such action will hasten the accumulation of a surplus, from which alone dividends can be paid," states William F. Pfeiffer, secretary and treasurer of the company.

Allis-Chalmers Gets $200,000 Ford Order

MILWAUKEE, WIS., Aug. 29—The Allis-Chalmers Mfg. Co., Milwaukee, has booked a contract from the Ford Motor Co. to furnish and install four turbine type electro-generators with an aggregate output of 8000 hp., in the new tractor plant which is being established at Troy, N. Y., on the banks of the Hudson. The contract is valued at $200,000. This is the second big contract for machinery placed by Ford with Allis-Chalmers. The first was to equip the large new saw and planing mills of the Michigan Land, Lumber & Iron Co., division of the Ford Motor Co., at Iron Mountain, Mich. The mills are now in operation and are producing virtually all of the lumber and stock required for Ford bodies, wheels and chassis woodwork.

Seek Reduction on Motorcycle Duty

Manufacturers Also Request Separate Classification—Many in Protest

WASHINGTON, Aug. 30—Representative motorcycle manufacturers have appeared before Senate Finance Committee to request a separate classification in paragraph 371 of tariff bill instead of being placed with bicycles, parts, etc. They also asked that the 30 per cent duty provided in House bill on motorcycles be reduced to 15 per cent.

Walter Davidson of Milwaukee, representing the Harley Davidson people, asked for a reduced rate, saying their object is to build up domestic production by preventing foreign makers from placing high rates against American motorcycles. He said there are scarcely any imported motorcycles for use in this country and figured that within a short time his company's exports would be two-fifths of its output.

William G. McCann of Springfield, Mass., representing the Hendee Mfg. Co., asked for reduced rates. He said England, Belgium, Australia, Spain and Italy had placed duties on motorcycles which amounted to an embargo on motorcycles, but Spain has lower rates, so this import market would be open to American producers. McCann said England is the only maker of motorcycles comparable in quality with American machines and that domestic makers here invite importations from Great Britain to aid in expense of development of motorcycle industry. It was his contention that American motorcycle makers have succeeded in having a number of countries reduce tariffs and expects to get further reduction from the countries and concessions from countries which are now holding out.

L. B. Fauber of Elyria, Ohio, representing Troxel Mfg. Co., did not approve of the reductions, but said they should not be lowered from House rates. He declared in favor of 45 per cent duty.

Parker Motor to Make New Car in Montreal

DETROIT, Aug. 29—Parker Motor Car Co., Ltd., has been formed in Montreal to manufacture the Parker car, a 6-cylinder assembled vehicle, with a new adaptation of spring suspension designed by Wright-Fisher Engineering Co., this city, to meet special road conditions in Canada. The company is capitalized at $10,000,000.

Production plans are being hurried through so that cars may be available at the time of the Montreal show. It is expected to build about 4000 cars a year and the price on the open models will not exceed $3,000. The company plans to buy at least 65 per cent of its parts in Canada.

PACKARD GIVES EMPLOYEES TWO WEEKS' VACATION; SOME WITH PAY

DETROIT, Aug. 29—Packard Motor Car Co., in compliance with a manufacturing plan formed early in the season, has closed for a two weeks' period to give its employees a two weeks' vacation. The factory will reopen on Sept. 10 on its regular manufacturing schedule.

Employees who have been with the company ten years are receiving full pay for the vacation period, those five years with the company are receiving half pay. Between 500 and 600 men will be kept at work to turn out rush orders, those entitled to vacations receiving double compensation.

Royal Rex Truck Has New Shipment Scheme

CHICAGO, Aug. 30—The Royal Rex Motors Co., Chicago, building motor trucks and motor buses, is featuring a new departure in truck shipments between the factory and dealers. The outstanding feature is the shipment of trucks in boxes and cases instead of total units. By the use of this method the transportation charges are very materially reduced and the shipments are arranged and packed in such a way that the truck can be assembled at the point of destination with a minimum amount of time and labor.

Aside from the shipping features of the trucks, there are several other up-to-date features. The chassis are in 1, 1½, 2, 2½, 3½ and 5 ton capacity. The intake air purifier for the purpose of eliminating dust is one of the engineering points. The frame is assembled without rivets, has no holes in the top web of the side rails and has a sub-frame of wood. The engine is supported in a steel cradle which in turn has a three-point suspension.

Perron Forms Company to Market Invention

SPARTA, WIS., Aug. 29—A. J. Perron, founder and president of the Perron Spark Plug Co., Sparta, Wis., organized two years ago, has formed a new corporation to manufacture and market another of his important inventions, consisting of a vacuum traffic signal for passenger and commercial cars. It is known as the Perron Signal Co., and its officers are: President and general manager, A. J. Perron; vice-president and secretary, John W. Jones; second vice-president, M. Reisinger; treasurer, S. A. Steel. The Perron Signal will be put into production at once. Patents were applied for April 2. The signal is placed on the front and rear of vehicles and consists of right, left and stop arms, which are operated by a steering wheel control deriving power from the manifold.

Money Market Eases in Indiana District

Receiver at One Indianapolis Manufacturing Plant Will Be Discharged Soon

INDIANAPOLIS, IND., Aug. 30—Considerable easement in the money market has been noted throughout Indiana in the last thirty days, and this week two especially significant stories came to the ears of automobile men, creating considerable interest.

One of the local motor car manufacturers has been in the hands of a receiver. The receivership soon will be discharged, it is expected. This, too, came as surprising, for the speed with which this company has readjusted has been unusual. The chief executive of the company, by telephone on Wednesday, was offered $125,000 which the person making the inquiry said "would be available soon."

Now, that much money six weeks ago or so would have seemed impossible of obtaining in Indiana. To top off that story is the second, which came from the official of an Indianapolis bank which has been handling motor vehicle paper.

"Right now we can use $50,000 worth of automobile paper," he said. The fiscal year of the company is just closing. Its record will show one loss of $1,500. This came because of the forced repossession of a big stock of automobiles. An opportunity came to dispose of them quickly at a price $1,500 less than the bank's equity. Credits have been "frozen" so long in Indiana that these "thaws" create no little comment.

Ford Planing Mills Now Shipping to Main Plant

MILWAUKEE, WIS., Aug. 29—The new saw and planing mills at Iron Mountain, Mich., owned and operated by the Ford interests under the name of Michigan Land, Lumber & Iron Co., are now making regular shipments to the main Ford plant at Detroit, and as production increases, distribution to branch plants will be effected. The mills were formally opened with due ceremony early in July. All of the machinery and equipment is of special design to suit requirements of the Ford plants, principally for body stock, other woodwork and crating and box material.

Shipments are being made by rail from Iron Mountain to Menominee, Mich., where the carlots are picked up by Ann Arbor carferries and go by lake to Reed City, Mich., where the main dry kilns of the Ford organization are situated. After treatment, the lumber is transferred to Detroit. To feed the new Iron Mountain mills, the Ford company has recently let contracts for 2,000,000 feet of logs, principally hardwoods, to Upper Michigan timber and logging jobbers. Deliveries to Iron Mountain have already begun.

$4,875,223 Deficit for Rubber Company

President Seger of U. S. Explains Statement for First Half of Year

NEW YORK, Aug. 30—C. B. Seger, president of the United States Rubber Co., is sending to the stockholders a statement relative to the operation and results for the first six months of the calendar year 1921.

After explaining that "in ascertaining the result for the first six months of 1921, the cost of goods sold was computed on the basis of the cost of goods carried in inventory as of the first of the year, plus the cost of goods manufactured during the period, thus absorbing in cost any depreciation that may have occurred in inventory after the first of the year and also the higher cost of goods manufactured during the period," he says that "computed in the manner hereinbefore explained, the results for the first six months of 1921 show a deficit of $4,875,223 after all interest and other charges." Continuing, Mr. Seger said:

Seger's Statement

"Against this the company has reserves, heretofore created out of income to cover contingencies that might arise, sufficient to offset this deficit, but it is deemed proper to report the actual results as stated above and await the realization of the results for the last six months of the year, which we hope and believe will show substantial improvements, due largely to the liquidation of stocks effected during the first six months and the lower cost of manufacturing during the last six months of the year, which will result from the reduction in price of basic raw materials, wages, and reduction of overhead made possible by increase in volume of production.

"It should be borne in mind that if the reductions in selling prices and other disadvantages referred to could have been anticipated they could have been provided for by appropriation of corporate surplus, applied to the further writing down of inventories as of Dec. 31, 1920, in which event the final net results would be the same as will result from absorbing in the operations of 1921 the amount of shrinkage resulting from these conditions."

Seasonal Conditions

In his circular to the stockholders Mr. Seger further explained the position of the company as follows:

"The business of this company, by reason of the major of the commodities handled, is subject to seasonal conditions and is necessarily conducted and must be considered on a yearly basis. Therefore, the results for any period of the year are not conclusive and might readily be misleading unless consideration is given to the condition under which the results were produced.

"The business recession that started during the last half of 1920 continued during the first half of 1921, with some improvement, however, in the latter part of that period. In order to meet this situation and conserve cash resources to the greatest possible extent, manufacturing operations were curtailed to the minimum consistent with actual requirements. This resulted in increasing the cost of production, due principally to absorbing those elements of overhead expenses which could not be eliminated.

"The cost of finished goods carried over as of the first of the year was conservative on the basis of the selling prices then prevailing, which prices it was believed would be maintained for the period of time necessary to effect the liquidation of stocks. Instead, however, it was found necessary to substantially reduce selling prices for some classes of merchandise, especially tires and mechanical goods. The effect of these price reductions was necessarily reflected in the results of sales for the first six months of this year in addition to which there was reflected in the net results for the period the burden of the higher cost of goods sold, as shown above.

"In addition to the effect of the reduction in sales prices and the higher manufacturing costs, consideration should be given to the matter of selling expenses. Owing to the seasonal nature of a large proportion of our business, the benefits of the sales efforts necessarily made during the first six months of the year will be favorably reflected, to a considerable extent, in the sales and profits for the last six months of the year, whereas the expenses are taken into account and charged against the income of the first six months, being the period during which they were incurred.

"As the result of this procedure selling expenses for the first six months of 1921, charged to the income account for that period, include a substantial sum representing the sales effort, the benefits of which will accrue in the last six months of the year and, in some cases, subsequently."

SEGER TO BE CHAIRMAN

NEW YORK, Sept. 2—C. B. Seger, president of the United States Rubber Co., will be elected chairman of the board when the directors meet next month, according to reports circulated in the financial district yesterday. Mr. Seger also is expected to retain the position of president. First reports had it that he would be made chairman of the board, to succeed the late Colonel Colt, and that a man not connected with the company would be elected president.

Detroit May Be Scene of Big Gas Cut Fight

DETROIT, Aug. 30—Detroit may become the center of one of the biggest gas-cut wars. The local gasoline sellers, whether just filling stations, garages or other places which sell gasoline to automobilists, have been fighting for a 2-cent margin of profit a gallon. All the refineries except the Standard Oil Co. have given in to the dealers. Recently the latter formed the Retail Gas and Accessories Dealers Association, and President H. C. Maule has declared that every possible effort will be made to get the Standard to agree to the 2-cent margin, and if the request is not granted, it is said that the dealers will refuse to handle Standard oil and other Standard products.

The curious side of the matter is, according to an official of the dealers' association, that the Standard company is allowing gas dealers a margin of 2 cents a gallon in practically every State but Michigan. At present, Standard gas is retailing at 18.9 cents, leaving only 1 cent profit to the dealer. Independents are charging 19.9 cents and the retailers' margin is 2 cents a gallon. It is said by some dealers that they favor a price-cut war to a finish, as it is a case of Standard against everybody else.

COAST HIGHWAY OPENED

SAN FRANCISCO, Aug. 30—The new Santa Cruz highway, connecting that city with San Francisco, was officially opened Aug. 26 by a parade of more than 200 automobiles from San Francisco. The San Francisco Motor Car Dealers Association officially opened the road and was the guest of honor at the ceremonies.

Low Prices Feature Toronto Motor Show

Many Model Changes Also Noted at Opening of National Exhibition

TORONTO, Aug. 27—Downward revision of Canadian car prices and many model changes were the outstanding features of the motor car show in the Canadian National Exhibit, which was opened here to-night by General Sir Julian Byng, of British tank fame, and Canada's new Governor General.

The exhibition slogan is "Business Is Good," and almost without exception business representatives attending declare that business is better than anticipated and that they look for a gradual improvement in conditions, reaching a peak in 1922.

All Makes Represented

Forty-seven car manufacturers and about thirty truck makers, mostly American, are represented. Particularly strong popular attention is being attracted by the new Durant car which was introduced in person by W. C. Durant, who spent the day talking with the trade and the public at his booth. Durant showed a green touring model. While the Canadian price has not been fixed, Durant said it would be "less than $1,300." Willys-Overland, Ltd., has a special Overland Four in the show with a composite body and a new series Reo also is shown. Austin, Vauxhall and Fiat are the only foreign cars shown. The London Six, made in London, Ont., is a new Canadian product on exhibition.

The automotive equipment show is the largest and most representative held in the Dominion. Sixty-seven exhibits of practically all leading Canadian automotive equipment manufacturers and jobbers are shown. A great collection of war photographs helps to attract many to the automotive equipment exhibit.

There are a score or more of tractors displayed and some motor boats and motor cycles.

Myers, Colt's Counsel, Dies After Operation

NEW YORK, Aug. 30—Nathaniel Myers, for many years personal counsel to the late Colonel Samuel P. Colt, chairman of the board of the United States Rubber Co., died early yesterday morning in the Lenox Hill Hospital of this city following an operation a few days ago in his seventy-fifth year.

GREYHOUND INCORPORATES

OTTAWA, ONT., Aug. 30—The Greyhound Motor Corp., Ltd., has been incorporated with a capital of $250,000. Head office, Montreal. L. C. Davis of Providence, R. I., and four Montreal directors are named in the Canada *Gazette* notice.

Peru Holds Its First Automotive Exhibit

Proves Most Extensive Feature of Independence Centenary—Trade There Heartened

LIMA, PERU, July 31 (*By Mail*)—The display of automobiles and automotive equipment, including trucks and tractors, was the most extensive and most attractive of the exhibits at the Industrial Exhibition held in connection with the celebration of the Centenary of Peruvian Independence. This exhibition has just gotten under way and will continue for some weeks.

The display is the first attempt at an automotive exhibition or show ever held in Peru. Taking into consideration that Peru has been suffering from a severe industrial depression, both Peruvian representatives and foreign manufacturers should feel greatly heartened by the industrial exhibition.

U. S. Far in the Lead

The exhibits showed the products of the United States, Great Britain, France, Italy and Germany, with the North American manufacturers far in the lead. The exhibit of El Vulcano—the Vulcan Iron Works of Lima and Callao—was conspicuous. This firm, which has large machine shops on the outskirts of Callao, is the agent for Marmon, Studebaker and Citroen cars; Mack trucks, Troy trailers, the Wallis, Yuba and Cletrac tractors, as well as Polack tires and other kindred lines. All of these cars, trucks and tractors were shown on the floor of the display room.

Delancy McKay & Co., a representative American house, made display of the Buick car, for which they are the sole agents for Peru. The National passenger cars, as well as Firestone tires, were also shown by this company. Fort Hnos, the Chandler representatives, naturally had their line on exhibition, and A. C. Shumway & Co., the Ford agents, who have recently greatly enlarged their dealer representation throughout all parts of Peru, showed the complete Ford line. This was accompanied by an announcement which stated the company had sold 600 Ford trucks, 700 Fordson tractors and 1400 Ford cars in Peru.

All Models Displayed

Wessel, Duval & Co., who have the agency for Cadillac, Haynes, Franklin, Chevrolet, F.W.D. trucks, Avery tractors and Miller tires, displayed a Cadillac touring car, an Avery tractor and Miller tires. Bergstrand displayed Harley-Davidson motorcycles.

The exhibit of Ferrand Hnos marks the transition from American to European products. This company is divided, displaying United States trucks, Indian motorcycles on the one hand and English Dunlop tires and English Austin tractors on the other. Tassaro Bosso & Co. also carry water on both shoulders, displaying the Lancia from Italy, in both touring and limousine styles; Rudge-Whitworth motorcycles from England and Federal tires from the United States.

The firm of G. M. & A. Petitjean had the French Berliet car which they are just introducing, and the well known Peruvian firm, W. & J. Lockett, showed the English Wolseley. Reiser Curioni & Co. made an extensive exhibit of Fiat cars, both limousine and touring, as well as trucks and tractors of the same make. They also showed Pirelli tires of Italian manufacture.

German Tire There

It is noteworthy that the steel faced, leather-tread pneumatic tire was exhibited by the European representatives. At the present, the metal stud tire is a rarity in Lima.

Last, but not least, in future potentiality was the display of Gildemeister & Co., of the German Continental pneumatic tires. This is the first time since the war that this tire has appeared in Peru. It is in inch as well as in metric sizes and of a scalloped tread rather than the ante-bellum ribbed tread. Gildemeister also exhibited a Hansa Lloyd tractor, which appeared to even a superficial observer like a converted tank.

The European automobile representatives played up the low gasoline consumption of their vehicles.

Taken as a whole, the American product, from cars to lubricating oils, held its own well in the display room. American cars running about the streets of Lima outnumbered European about 50 to 1.

New Adria, $1,500, to Be Built at Batavia, N. Y.

NEW YORK, Aug. 30—The Adria, a new car to sell at $1,500, will move to a new factory in Batavia, N. Y., early in September. It is planned to make a reasonable number of cars this fall and to start production on a larger scale during the winter to be ready for spring buying.

One of the features of the car is the rear axle, which has no axle housing. Its place is taken by a light axle formed of three pieces bolted together as a single unit, this carrying shackles for the springs and spindles for the wheels. This reduces the unsprung weight almost to a minimum, as the pieces are of seamless steel tubing. Specifications include Supreme engine, 3⅜ x 5, Delco ignition, Bijur starting and lighting, Borg & Beck clutch and Gemmer steering gear. Wheelbase is 120 in., tires 33 x 4.

800 on Durant Payroll at the Muncie Factory

INDIANAPOLIS, Aug. 30—Between 700 and 800 men will be on the payroll of the Durant Motor Co. at Muncie by Jan. 1, according to Dennis A. Burke, president and general manager of the concern, and the Muncie Durant plant will be in production before that date. The Durant company recently bought the Sheridan Motor Co.'s plant in Muncie.

Cincinnati Plans Accessory Exhibit

Manufacturers and Allied Interests to Participate in Show This November

CINCINNATI, OHIO, Aug. 30—John Behle, manager of the Cincinnati Automotive Trades Association, is planning a fall automotive accessory and equipment exposition, to be held at Music Hall, this city, one week in November, in which all local automotive merchants, manufacturers and allied interests are expected to participate.

In a letter sent out to the members of the association recently the idea of the exhibit was outlined, and returns from these letters indicate that the members are very favorable to the exhibit, which is a new idea for this city.

A similar exhibit was given last December in connection with the Ohio State automobile show held here. It far exceeded the expectations of those who had charge of it, and only about half as much space was provided as could have been used. The success of this venture is the foundation upon which the accessory show is being planned.

Last year the exhibit was made up of manufacturers who were showing their products chiefly to the dealers. This year the dealers and manufacturers will show their products for the benefit of the individual owners of cars and trucks. It will comprise everything in the line of accessories, equipment, supplies and repair parts.

"There is every reason why it should be a success," said Mr. Biehle in discussing the proposed show. "Owners of automobiles have only a slight first-hand knowledge of most of the accessories that are made for their cars. This show will be a good place for them to see and learn about these things. Also, it will give the dealers and manufacturers an opportunity to place their products before the ultimate consumers."

The show will be open to Cincinnati dealers and all manufacturers who distribute their products through jobbers and retailers. Both dealers and manufacturers will be solicited to create interest in the show.

In addition to the exhibits there will be daily educational lectures and demonstrations for the motorist, also attractive entertainments.

Dedication of Coast Road Draws 1500 Crowd

SAN FRANCISCO, Aug. 30—Approximately 1500 persons attended the dedication of the new Franklin canyon highway, between Martinez and Pinole. The road, which is of crushed rock foundation with a five-inch concrete surface, 20 feet wide, cost $300,000, and was constructed by Mrs. Ellen O'Brien, widow of a contractor of Martinez.

Birmingham Motors Formed in New York

Will Build New Type Automobile to Be Made Without Axles

DETROIT, Aug. 29—Birmingham Motors, a trust, has been organized at Jamestown, N. Y., to build a new type of automobile, which will be constructed without axles, the drive being by spindles, and the frame suspension being entirely upon cross-built springs. It is claimed for the car that the only unsprung weight is the wheels. Production is looked for about the opening of the 1922 show season.

The car is the idea of C. E. Weaver, who has been connected with the industry since its early days, serving first with Franklin and latterly being instructor in mechanical branches at the University of America, Washington. Engineering work and perfection of the design was handled by the Wright-Fisher Engineering Co., this city.

Basic Patents Purchased

The Birmingham is declared by Weaver to depart from all previous construction ideas, except for the design of the Cornelian car which was built by Blood Bros., several years ago, at their Allegan, Mich., plant. All patents held by Blood Bros. have been purchased by Birmingham Motors, and in addition patents have been applied for on improvements.

Aside from the special spring construction, the car will be made of standard units, including 6-cylinder Continental engine, Stromberg carbureter, Bijur starting and lighting, Gemmer steering gear, Borg & Beck clutch, Exide battery, Detroit gearset, Timken bearings, Michelin disk wheels; wheelbase will be 124 in.

G. M. C. Truck Production Between 15 to 20 a Day

DETROIT, Aug. 30—General Motors Truck Co. at Pontiac is producing between 15 and 20 trucks a day and unfilled orders are larger than at any time since March. Increased business is attributed to recent price reductions.

W. L. Day, president, says in part: "We are building trucks from material bought at peak prices and while we are not making anything on the trucks at the new prices, we believe that we must accept our losses as do others. I am confident that September, October and part of November will be a good business period, and December and January probably will be dull."

Olds Passenger Cars and Trucks Reduced

NEW YORK, Aug. 30—The Olds Motor Works announces that the following new prices for Oldsmobile passenger cars and trucks are effective Monday, Aug. 29:

	Old	New
43-A, 4 cylinder car:		
Touring	$1,345	$1,145
Roadster	1,325	1,145
Coupe	1,895	1,645
Sedan, 5 passenger	2,100	1,845
Small 8, No. 47:		
Touring	1,725	1,625
Coupe	2,225	2,185
Sedan, 5 passenger	2,425	2,425
Large 8, No. 46:		
Touring, 7 passenger	1,875	1,735
Pacemaker, 4 passenger	1,825	1,735
Sedan, 7 passenger	2,775	2,635
Truck:		
Chassis	1,250	1,095
Chassis with cab	1,325	1,175
Chassis with express body and top	1,395	1,245

Mercer Motors Cuts Price on All Models

TRENTON, N. J., Aug. 30—Mercer Motors Co. announces price cuts on all models. The new prices follow—Sportabout, touring, runabout and raceabout, $3,950; touring, limousine, $5,650; coupe, $5,150.

In explaining this price change, the new management, which recently took over Mercer affairs, state that it is made largly possible by the savings effected through the operation of the company's affairs entirely at the factory instead of through Hare's Motors, as formerly.

It will be recalled that Mercer prices were increased by Hare's Motors last March, and this reduction carries the list back to where it was prior to the increase.

Stevens-Duryea Cuts Four of Its Models

NEW YORK, Aug. 30—Stevens-Duryea, Inc., has announced a price cut on the following models:

Name of Car	Old Price	New Price
Two passenger	$8,500	$7,250
Four passenger	8,000	6,900
Seven passenger	8,000	6,800
Sedan, four passenger	9,500	9,000

PEERLESS CARS CUT

DETROIT, Aug. 30—Peerless Motor Car Co. of Cleveland has reduced prices $100 to $180.

	Old Price	New Price
Touring	$2,990	$2,880
Roadster	2,990	2,880
Coupe	3,600	3,500
Sedan	3,950	3,790

ROAMER MAKES CUTS

NEW YORK, Aug. 31—The Roamer Motor Car Co. has announced a second reduction in all its models:

	Old	New
4 passenger sport	$3,150	$2,650
2 passenger roadster	3,150	2,750
7 passenger touring	3,250	2,750
4 passenger coupe	3,985	3,850
5 passenger sedan	4,100	3,950

ASK IMPORT STAMP

OTTAWA, ONT., Aug. 30—An order-in-council has been passed changing the date after which all goods imported into Canada must bear the name of the country of origin, as required under the new custom regulations, from Oct. 1 to Dec. 31, 1921. This alteration has been made to allow ample time for the importers.

Coast Automotive Men in Convention

Northern Division Hold Annual Meeting—Enthusiasm Among the Delegates

SAN FRANCISCO, CAL., Aug. 30—The northern division of the California Automobile Association held its semi-annual meeting at Al Tahoe, on the shores of Lake Tahoe, in the high Sierras, Aug. 20 and 21. More than 100 delegates from all sections of the state north of the Tehachepi mountains were in attendance, and there was more enthusiasm among the delegates than noted at previous meetings. George Haberfelde, state president, occupied the chair throughout the meeting. The report of Robert W. Martland, secretary manager, showed the association to be in good financial condition and to be growing steadily and rapidly.

Co-operative Buying

The principal discussion of the convention centered on the co-operative buying projects that are springing up continually in all parts of California. It was shown that some of the less well-known firms are offering large discounts to get business. This was disapproved, and the automobile tradesmen were shown clearly that giving discounts where they are unwarranted, or in larger amount than good business acumen would dictate, will soon wreck the retail business, either in automobiles or in equipment for them. It was demonstrated to the delegates that the margin of profit is so small now that those in the business will "go into the discard if they do not get full profits." Costs of doing business in these lines were shown by figures.

Craft Discussions

The first day of the convention was given over to craft discussions, the association being divided into various crafts, so that all the men in the same line of business meet together and thresh out their difficulties and air their problems. The second day was devoted to the general meeting, when reports of the crafts were read and general discussion given full time. Effects of price reductions on the dealers and on the trade in general were presented by various dealers. It was pointed out by L. H. Bennet, a commercial expert, that few garages in the state apply real selling methods to their businesses. Mr. Bennet demonstrated that a few dollars a day in extra sales would cover the overhead on every one of these garages for some time to come. Reports indicated that the failures among members of the association were some 60 per cent fewer in number than among those in the same lines outside the association.

The next semi-annual convention of the association will be held in February in San Jose, Cal., the exact date to be fixed later.

Car's "Visible Value" Factor in Selling

Briscoe Sales Chief Says Average Buyer Eliminates Cost in Purchase

SAN FRANCISCO, CAL., Aug. 30—The visible value of a car to-day is a greater factor in inducing the public to buy than are price reductions. This rather unusual view of the automobile selling situation is contained in a letter from Kelly R. Jacoby, vice-president in charge of sales of the Briscoe Motor Corp., just received by Frank O. Renstrom, Briscoe distributor here. Jacoby had just returned to the factory from a swing around the circle, in which he got first-hand information on the retail market for automotive vehicles in every State from the Canadian border to the Gulf of Mexico and from the factory westward to the Pacific Coast. His letter says, in part:

Car Buyer After Value

"The story is the same everywhere you go; the car buyer is after value. The tremendous confusion caused by many weeks of price reduction is now, happily, being dissipated. The automobile buyer is a pretty careful analyst; he no longer accepts everything told to him as gospel truth, that is to say, he accepts some, but he rejects much. He tries to strike an average of comparison and on that firm basis forms his opinion of the various makes of cars.

Reductions Trivial

"The average car buyer, at least those with experience, failed to enthuse over price reductions, for the simple reason that he felt that quality was being reduced with the price. In some cases, their suspicions may have been correct; in the majority it was not, but that does not alter the fact that the buyer and the prospective buyer to-day want value received for every dollar they put into an automobile."

Chinese Airplane Gives Excellent Performance

WASHINGTON, Aug. 30—Several successful flights have been made with a hydro-airplane constructed by Chinese engineers at the Chinese Government Dock & Engineering Works at Foochow, according to a report made to the Bureau of Foreign and Domestic Commerce. All the material used in the construction of this plane, which was specially designed by a Chinese engineer, with the exception of the engine, which is of American design and manufacture, was produced in China. The works have several more of this type of airplane under construction for use by the Chinese navy. The success so far achieved is expected to give quite an impetus to aviation development in China.

Southern "Town in Himself" Has Good Chance of Beating This Case—In Fact, He Can't Lose

ATLANTA, GA., Aug. 24—In a small town the automotive accessory dealer may just as well be the town preacher, postmaster, lawyer, etc.

In one of these towns just outside of Atlanta a few days ago a salesman with automotive specialties sold a fairly good sized order. When the goods arrived, however, the dealer found that they were of inferior quality and not nearly up to the standard as claimed by the salesman. Therefore he promptly returned them to the manufacturer. Shortly thereafter the house endeavored to force collection of the bill. First a sight draft was drawn on the dealer through the local bank, and was returned in a few days unhonored. The house then wrote the postmaster asking after the financial standing of the dealer, and was informed that he was o. k. By return mail the manufacturer wrote the postmaster asking him to secure an attorney for him and force collection of the bill. The manufacturer received the following reply:

"The undersigned is the dealer on whom you attempted to palm off your worthless specialties. The undersigned is also the president of the bank to which you sent your sight draft. Furthermore, the undersigned is the postmaster to whom you wrote, and the undersigned is also the attorney whose services you seek to force collection of this bill. Your methods are nefarious considering the inferior quality of the goods sent me and the extravagant claims made by your salesman. The undersigned is so angry that if he were not also the preacher of the church in this place he would be sorely tempted to tell you to go to h—."

Detroit Preparing for Convention of M. A. M. A.

DETROIT, Aug. 29—C. W. Dickerson, vice-president of Timken-Detroit Axle Co., who is chairman in chage of Detroit arrangements for the "Back to Normal" credit convention of the Motor & Accessory Manufacturers' Association, has about completed plans for the reception and entertainment of delegates and guests. The two opening days of the convention, Sept. 14 and 15, will be given to business sessions with the dinner on the 14th evening.

The 16th will be a day of recreation at the Detroit Golf Club. Wives of delegates will be entertained during the sessions with sight-seeing trips about the city and lakes, and social events at the Detroit Boat Club and the Detroit Athletic Club. Edgar A. Guest will be the sole entertainer at the convention dinner.

Acting on the Detroit committee with Dickerson are E. T. Ailes, treasurer Detroit Steel Products Co.; M. A. Moynihan, secretary Gemmer Mfg. Co., William Hendrie, secretary Detroit Gear & Machine Co.; Thomas M. Simpson, credit manager Continental Motors Corp.

Stockholders Against Automotive Receiver

TOLEDO, Aug. 30—Officers and directors of the Automotive Corp., tractor manufacturers, decided at a meeting of stockholders to fight to a finish the petition filed by E. E. Hallet, Archbold, Ohio, stockholder, asking for the appointment of a receiver for the company.

It was stated that stock sold to a brokerage house for $14 had been sold at $25 a share. The par value of the stock is $15. Attorney Denman also declared that the company had valid contracts for $2,250,000 worth of tractors but that production had been held at a low ebb by business depression's effect on demand.

Pre-Selex Gear Shift Launched in Illinois

CHICAGO, Aug. 29—Pre-Selex Gear Shift Corp. has been organized in Illinois for the manufacture and sale of the Pre-Selex mechanical gear shift, which is designed to eliminate entirely the hand-shift lever and permit gear shifting through the clutch pedal. This shifting is accomplished without springs or electricity.

Ten leading automobile factories are preparing to test the Pre-Selex gear shift. Manufacturing plans are now under way.

The company's affairs are in the hands of Franklin A. Miller, vice-president, who has been associated with the industry for a number of years. He was at one time advertising and assistant sales manager of Stromberg Motor Devices Co. Executive offices of the company are at 750 Railway Exchange Building, Chicago.

Remodeled Airplanes for Mail Service Route

WASHINGTON, Aug. 30—Six remodeled army airplanes, which will carry double the amount of mail carried in the D. H. type machines now in use, will soon be placed in operation on the transcontinental air mail route between New York and San Francisco, the air mail service announces.

The planes will carry 800 pounds of mail or 32,000 letters, with no additional cost in fuel or pilots, the statement said, and were remodeled at a cost of $3,000, whereas the cost of the new machines would have been $15,000 each.

BRITISH TRACTOR CUTS

LONDON, Aug. 10 (*By Mail*)—Tractor prices have dropped until it now is possible to get a good, fair powered utility tractor for $1,500 (normal exchange).

Mexican Sales Grow; Revival Has Started

Business Shows Improvement in Some Phases—Transportation Still Big Problem

CITY OF MEXICO, MEXICO, Aug. 24—According to the statement of dealers, there has been a marked improvement in some phases of the business during the last few months. Even during the protracted revolutionary period a considerable number of automobiles, motor trucks and delivery vehicles were purchased in the United States and brought to Mexico, despite the fact that all shipments had to be paid for in cash at the border, and that there were delays in making transfers from one railroad to another and in transporting the cars to destination.

Transportation Problem

The transportation problem is still unsolved as to automobiles, as well as all other kinds of shipments. It is met in a measure, however, by shipping practically all automobiles by express from Rio Grande crossing points. Even express shipments are slow. It usually takes twelve days for an express car of automobiles to move from Laredo to the City of Mexico, a distance of about 800 miles. The practice of giving credit to reliable dealers is rapidly taking the place of paying cash for cars at the border.

It is estimated that there are approximately 20,000 motor vehicles in Mexico, including automobiles, delivery vehicles and motor trucks. This is a very small number when it is considered that the country has a population of more than 15,000,000 people. Just what per cent of inhabitants might be considered as prospective buyers of cars there is no means of determining. It has been said that the laboring class numbers fully 12,000,000 people. There is little prospect that many of this element will reach the automobile buying stage for many years to come unless there should be a phenomenal rise of wages.

Revival Has Started

During the last few months there has been a great revival of automobile sales and the establishment of agencies, accessory houses and garages. This is especially true as to the City of Mexico, which is the center of automobile distribution for the greater part of the country.

Practically all of the American and French automobile manufacturers who are reaching out for foreign trade are represented in Mexico. This is especially true as to the larger and higher priced cars. Although there are a number of American dealers here the business is not confined to men of any one nationality. This is the case not only as to the sale of automobiles and other motor vehicles, but also applies to accessories and garages.

One of the oldest and largest agencies in the City of Mexico is B. Estades y Cia., whose place of business is Av. Bucareli. The company is composed of B. Estades and R. Romano. The sales manager is J. F. Canales, who has had long experience in the various branches of the automobile business not only in the United States but in Europe and South America. He has brought American methods of salesmanship to the agency with which he is now connected. The company handles the Packard, Renault, Paige, Briscoe and Pierce-Arrow automobiles and the Packard motor trucks. In discussing the automobile situation in Mexico, Canales said:

Buying Power Good

"Although business conditions are not as good as they might be, the buying power of the people seems to be remarkably good when it comes to the purchase of automobiles and motor trucks. This agency sells about 25 cars and trucks a month. The banks here do not give credit to dealers as a rule. We have a credit of not over ninety days. We sell cars on one-half cash and the balance ninety days. During the last few years there has been a tremendous influx of second-hand cars to Mexico from the United States. There are now so many of these used cars in the country that they may be bought cheaper here than across the border. There must be a general discarding of worn-out cars in the not far distant future and this will improve the demand for new cars.

"We have a well equipped repair shop in which native workmen are employed with the exception of a German electrician. We have found that Mexican mechanics learn the trade quickly. They are adepts when it comes to picking up the fine points of automobile repairing. We sent our German electrician and chief mechanic, Gustavus Schmidt, to the Packard factory for a year's practical training and we found that the investment brought us good returns. We have three salesmen on the street and they use the same sales methods that are practised by the more progressive agencies in the United States.

"We carry a stock of about 100,000 pesos worth of tires. There are two automobile tire manufacturing plants in Mexico, both being located here. They make tires of all sizes. One is called the Azteca Tire Company and the other is the Pelzer Tire Company. Their products sell for about 25 per cent less than American tires."

Paige Enclosed Car Output Quickly Sold

DETROIT, Aug. 29—Paige Motor Car Co. sold out its entire August production of enclosed cars in the first five days of the month. The demand is reported at the factory to be far in excess of former seasonal demand for enclosed types, and production will be increased to meet sales requirements.

Used Car Situation Better in Spokane

New Cars Going Well Also as Credit Allowances Speed Up

SPOKANE, WASH., Aug. 30—With improved business conditions and credit allowances gradually speeding up sales of new cars, Spokane automobile dealers are finding that the used car situation is assuming a less drab aspect.

Sales of used cars are dependent upon new car sales, according to E. Stock, managing-secretary of the Spokane Automobile Chamber of Commerce. Seventy-five per cent of new car sales entail used car transactions, says Stock.

"The used car situation is always a step or two behind the new car market, for at least 75 per cent of dealing in new cars is done with persons already owning cars," said Stock. "During the recent period when the automobile industry openly marked time the used car situation assumed rather discouraging proportions.

"At present the used car situation is more favorable to both purchaser and dealer. The situation is no doubt much more favorable to the purchaser than it will be during the winter months, when the car sales season is expected to slow up somewhat. When this winter period of less numerous new car sales comes, dealers will be careful about taking used cars in trade. The exchange valuation allowed will necssarily be lower and no trades will be made unless the dealer is reasonably certain of a quick turnover."

Durant Announces Oakland Home Site

OAKLAND, CAL., Aug. 30—R. C. Durant, president and general manager of the Durant Motor Co. of California, has definitely announced the site of the Durant assembly plant in Oakland to be at East 14th Street and 106th Avenue. The site consists of 18 acres, on which will be built exclusively class A buildings, construction to be of concrete throughout, with buff pressed-brick facings and gray granite trimmings. The main building will have a frontage of 600 feet, from which will run three wings, each extending 400 feet, thus forming courts which will allow all windows the greatest possible amount of air and light. All buildings are to be of two stories.

The powerhouse will be situated between the wings, and the water tank enclosed in concrete to conform to the general plan of the plant. The second floor of the factory will be devoted to body building, paint shops, upholstery and trimming shops. The finished bodies will be sent through chutes in the floor to the waiting chasses on the main floor, where they will be carried on endless chain conveyors through the various processes of assembling.

Reorganization of Locomobile Decided

Company Divorced from Hares Motors Following Meeting of Stockholders

BRIDGEPORT, CONN., Aug. 27—Reorganization of the Locomobile Co. through which Col. Elmer H. Havens, junior member of the firm of Hunter & Havens of this city, president of Bridgeport Board of Education and prominent in financial, industrial, civic and fraternal circles, becomes head of the corporation and has already assumed charge of the big Main Street plant, was consummated at New York yesterday, according to announcement here to-day. Frank R. Hickman is associated with Colonel Havens, as vice-president and treasurer of the corporation.

These revolutionary changes and reorganization of the corporation were perfected at a meeting of the stockholders in New York. Through them the Locomobile Co. is wholly divorced from Hares Motors, Inc., which had charge of manufacturing and selling the automobiles built at the Locomobile plant here. Mr. Hickman was a former president of the Locomobile Co. of America, which was organized April 1, 1920, as the Locomobile Co. He was also treasurer of the Hares Motors, Inc.

Confirms Reports

President Havens confirmed reports of his election and the reorganization of the corporation, when interviewed at his Southbury, Conn., summer home. However, he was not ready to make a statement as to the plans for the new organization, but said that operations will be resumed at the local plant as soon as business conditions warrant. Colonel Havens and Mr. Hickman represent the creditors of the Locomobile Co. in the latest reorganization.

Rumors of a dissolution of Hares Motors, Inc., which were in circulation here a number of weeks ago, are not borne out by the change. It is pointed out that the connection of Hares Motors, Inc., with the Locomobile Co., to which the name of the local corporation was changed last year, were in the form of a contract for operation of the plant and the selling of its products. At that time the officers of Hares Motors were made officers of the Locomobile Co. Those officers have now resigned and have been succeeded by the local men, Messrs. Havens and Hickmar

Contract Is Dissolved

The contract between the Locomobile Co. and Hares Motors, dissolved yesterday by the reorganization of the former corporation, took effect April 1, 1920, and, at the same time, the Mercer Motors entered into a similar agreement. The Mercer Co. withdrew from the agreement April 1 last. Hares Motors is a separate corporation, according to E. L. Larson, works manager of the local plant, and the reorganization and withdrawal of the Locomobile Co. does not affect it.

Won't Discuss Capital

At the time the contract with Hares Motors was made, the Locomobile Co. of America was reorganized into the Locomobile Co. and recapitalized. None of those interested would state to-day as to whether any new capital has been put into the corporation under the latest reorganization.

E. L. Larson, who has been works manager under Hares Motors, has tendered his resignation, to take effect Sept. 1, but may remain for some time in an advisory capacity, although his active duties have been practically completed. He stated to-day that he is not acquainted with any of the details connected with the reorganization of the corporation. His successor has not yet been appointed.

20 Years in Bridgeport

The Locomobile Co. of America located in this city about 20 years ago, during the early days of automobile manufacture, at first making a steam propelled car. The manufacture of gasoline-propelled vehicles was soon taken up and the Locomobile, in a short time, became one of the most popular of the higher priced cars in the country. Several times the Locomobile was a competitor for the Vanderbilt cup, highest honor in automobile racing, and was successful, after several trials, in winning that classic.

Originally, starting in a small way in East Bridgeport, the business of the company has been enlarged and the present big plant at the foot of Main Street was built a decade or more ago. During the recent war a large amount of important war work, including the manufacture of trucks, tanks and other similar equipment, was turned out there.

It is expected the work at the plant will go on with added vim from now on.

CONVICTS TO MANUFACTURE 1922 LICENSE TAGS AT OHIO JAIL

COLUMBUS, O., Aug. 30—License tags for 1922 will be manufactured by the convicts in the Ohio Penitentiary, as has been the case in the past few years. The 1922 tags will be on battleship gray background with blue letters and numerals. The number the coming year will be divided by a hyphen as in many States. This is a new feature to the Ohio tags. There will be the letter D to designate dealers and manufacturers; E for electrics and T for trucks. Gasoline passenger cars will not be designated with any letter. In all there will be approximately 800,000 tags manufactured for 1922.

Sherman Puts Pep in Montreal Meeting

A. E. A. Merchandising Director Is Principal Speaker at Session at Montreal

MONTREAL, CANADA, Aug. 30—The first meeting of the Montreal auxilliary of the Automotive Equipment Association was held at the Windsor Hotel with Ray W. Sherman, merchandising director of the Automobile Equipment Assn., as the chief speaker. Other speakers who addressed the meeting included A. J. Hays, president of the Champion Spark Plug Co. of Canada, Ltd., and chairman of the Automotive Equipment Association; E. J. L'Esperance of the Imperial Life Insurance Co., Montreal, and N. H. Oliver, general sales manager of the Metal Specialties Mfg. Co. of Chicago. The gist of the addresses of the evening was "Sales Promotion," and the formulating of new selling ideas which would bring into closer contact manufacturer, wholesaler, retailer and consumer.

For five minutes Sherman kept his audience in laughter describing his first two attempts at public speaking.

"To come down to business," he interposed, "this is the biggest thing that has happened in the motor industry and I venture to say that no other industry has started such a movement. We are out to do something for public weal and to put it over we must stick to the job. It can be done and will be done, nothing can convince me otherwise. As testimony of the faith I have in the proposition, I offer the fact that I willingly threw up one of the best positions to give my time to this work. I am not going to burden you with figures and statistics of the motor trade—you have probably been given these before and have perhaps read them time and again—but by trying to make my 'speech' more in the nature of a chat and giving you a few examples of how selling can be done and at the time of selling the dealer is shown that there is more in it than waiting for someone to ask for a certain article.

"Our first object is to get the goods off the dealer's shelf, by showing him how to get them off, and how to instill the idea of 'asking people to buy.' And all this is dependent on the salesman, we must have men who are enthusiastic, like their work and the people they are working for; and if every salesman will give his support just think how the business will grow. We have got to do away with the dirty shop and dusty shelf idea, we must set up inviting displays in the dealer's premises conveying the 'idea' of the goods and what their advantages are.

"The salesman must understand that the retailer is a personal friend, and he should see that that state comes about, and that he has a greater influence over the retailer than is realized. We must make the manufacturer, wholesaler, and dealer believe in this thing. When that happens mutual benefit and increase of business all round will come about. When you take into consideration the usefulness of nearly all motor accessories and the comparatively small price it is easily seen that a 'dead stock' proposition is—or should be—unknown in the automobile accessories business. Every season is a selling season, so where does the kick come in about slack business? That is usually the cry of the man who has not the stamina to 'stick it' and who 'thinks he's beaten.' Give us your earnest support in this 'closer contact' proposition and you will not only be helping us, but yourselves."

Business Prospects—Loom in South Africa

Business Steadily Improving, Survey Shows—Exports on the Increase Again

NEW YORK, Aug. 31—Business conditions affecting the sales of automotive equipment in South Africa are steadily improving and exports of such equipment from this country are again on the increase, with the probability that August shipments will be materially higher than those of July and June. This opinion was voiced at the local office of the National Bank of South Africa, Ltd., coincident with the issuance of the results of an automotive survey of that country. The survey was the result of a questionnaire sent out by the New York office and which was answered by the managers of the bank offices at Capetown, Johannesburg, Bloemfontein, East London, Port Elizabeth and Durban.

Favor Lighter Cars

The survey took up the question of road building, the competition of European manufacturers in motor car and tire lines, the development of motor truck use and the subject of spare parts. The most interesting part of the survey was, perhaps, that devoted to the European light car, the question being asked as to whether the high price of automotive fuels in South Africa would cause car owners there to drift away from the American product in favor of the lighter and smaller models built in the Old Country.

"These, in the form of the Calcott, Morris-Oxford, Swift and 'Baby' Standard, are now to be seen in increasing numbers on the streets, the last-named preponderating," read the Capetown report. "They appear to be popular for city use, but are heavily handicapped by virtue of their high initial cost. It is pointed out that in this country it is not weight reduction but efficiency of the engine that will count in the future—i.e., the small but efficient engine giving 25 m.p.g. (imperial gallon 20 per cent larger than American gallon). One authority states that the small foreign engine is not economical for country running owing to heavy gradients and road conditions generally. Also, owing to frequent gear changing the small engine brings about transmission troubles which counterbalance its apparent advantages."

Truck Usage Grows

This report was similar in tone to those from the other localities, the point being made that such cars were not adapted to the agricultural regions and that their first cost was in excess of the well known American makes.

Truck utilization is growing slowly in South Africa, the report from Capetown again reflecting the opinion from all districts.

"The truck is slowly but surely replacing horse traffic, at any rate in the larger cities, but not for long distance," the report states. "It is largely used by commercial houses for town and suburban use, but to a limited extent, if at all, for agricultural purposes. There are more motor trucks in the Cape Peninsula than in any other center of South Africa, owing partly to the inefficient railway goods service and partly to better roads. In Johannesburg there would be a large field for expansion but for the fact that prospective users are diffident about employing colored drivers."

Bloemfontein answered that the one-ton truck is proving a commercial asset and that, with normal prices, a large number will be employed, especially by farmers. The Johannesburg office added that educational work would be desirable to further truck operation.

The parts situation in some localities was reported as being good, with owners having little difficulty in Capetown and Johannesburg in obtaining parts. The Capetown report declared, however, that prices for such parts are often excessive and that car owners thought this serious. East London dealers were not so fortunate, and it was said that garages were having difficulty in obtaining other parts than for Fords.

American Cars Lead

The known predominance of American makes of cars in operation in South Africa was shown by statements that our makes were from 70 to 95 per cent of the total, the smaller figure being reported from Port Elizabeth and the larger from Johannesburg. American and British motorcycles were reported from Durban to be in about even proportion and the statement was added that British firms are backward in service and merchandising effort.

The tire situation was not so promising, as the European Dunlop, Michelin and Pirelli are obtaining a good place in the market. Capetown estimated that American makes of tires held about 50 per cent of the sales, this likewise being true of Johannesburg. The American makes reached 75 per cent in Bloemfontein and Durban added that British and American makes were about even in price.

To Improve Highways

No railroad extension work took place last year and none is expected this year, but highway improvement and maintenance is being continued. The Provincial Council of the Cape Province increased the 1919-20 appropriation of £54,500 to £57,300 for 1920-21, although this may be modified somewhat. The main roads in this province total 3956 miles, with an additional 24,727 miles of divisional roads, with some 2589 miles more in Transkei, Hershel and Glen Grey.

The present road expenditures are triple over what they were eight years ago, and a scenic highway, about 100 miles in length, is nearing completion. This provides an all-round route to cover the Peninsula and opens up some picturesque and hitherto inaccessible districts.

The sale of South African products is increasing, it was added, and this has cleared the financial situation materially.

Tractor Trials in England Sept. 20-24

Manufacturers and Traders Society Announces 62 Entries for Event

LONDON, Aug. 19 (*By Mail*)—The Society of Motor Manufacturers and Traders is clearly justified up to the hilt in its determination to proceed this year with its tractor trials. The entries are now complete and the total should be more than gratifying to the promoters. They testify to the belief of the makers of both tractors and implements in the value of these annual trials and in the future of the industry. Manufacturers evidently realize that it is largely upon the results of this year's tractor trials that next year's trade will depend.

It is interesting to compare the entries with those for 1919, the society's first trial. On that occasion entrants were permitted to enter three machines of any one make and type, and as a result 56 tractors were entered for the trials. This year the society only permits the entry of two machines of any one make or type, yet, notwithstanding this restriction, no fewer than 37 tractors are entered.

Additionally, 25 special implements have been entered for test and report; these being quite apart from the implements necessarily entered with the tractors for the purpose of demonstration and test of the tractors themselves.

In addition to the trials there is to be an extensive exhibition of power farming machinery. The entries for this exhibition are not yet complete. If present indications may be taken as a guide, however, this section of the event bids fair to rival the interests of the trial itself.

Make Tests of New Ray Battery; Study Others

NEW YORK, Aug. 30—A test of the Ray storage battery and of several other makes was made at the New York Electrical Laboratories recently to demonstrate the ability of the Ray construction to stand up under conditions of heavy charge and discharge. The test lasted two days. On the first day each battery was in turn discharged at 200 amperes for 1 minute and then at 100 amperes until the voltage was down to zero. The Ray held up 31 minutes in this test we are informed. After this test all the batteries were connected in series and charged at the rate of 100 amperes for the first hour and at 25 amperes for the next sixteen hours. When this charge was completed the batteries were again put through the discharge test. The Ray battery started at a discharge of 200 amperes which continued for one minute, and then gave 100 amperes for four minutes. The batteries were of the 6-volt, 11 plate type.

Federal Report Says Trade Is Improving

Industry Feeling Way Out of Depression—Reductions and Good Crops Responsible

WASHINGTON, Aug. 31—Analysis of reports received from agents of the Federal Reserve Board on business conditions throughout the country show that the automobile trade is feeling its way out of the economic depression. The price reductions have stimulated sales and the early marketing of crops puts the farmer on the prospect list because of his improved financial status. The movement of crops away from farms is expected to have a salutary effect in the liquidation of outstanding indebtedness and provide a favorable credit situation.

See Foreign Gain

The board has found evidence of improvement in some branches of foreign trade and with a fairly good agricultural yield and enlargement of manufacturing demand, it is believed the autumn season will be encouraging to trade. The Federal agents state, however, that the situation is not such as to forecast any extensive or immediate revival of business in a large sense.

Because of the fact that manufacturers and dealers alike are interested in the question of price stabilization, it is significant to note the opinion of the Federal Reserve Board: "Price movements have been on the whole limited, but with a slight upward tendency in the case of some groups. The Federal Reserve Board index prepared for international comparisons shows an increase of two points to 141. The index number of the Bureau of Labor Statistics for July was 148, the same as during June. The current price reports for the early part of August indicate if anything, a strengthening of prices in some lines."

Forecasts Difficult

"On the whole it is impossible to forecast the general trend of prices during the month. Manufactured goods have probably held relatively firm, but as has been indicated above, many important raw materials have declined. Prices in general during the past three or four months have become somewhat more stabilized than they were in the early spring, but whether this period of relative stability will continue, whether prices will rise appreciably, or fall is a matter for speculation. A continuation of relative stability in the price level as a whole might be marked by more or less extreme variations in the prices of individual commodities if the variations cancelled one another. For instance, increases which might occur in the prices of commodities which have been "liquidated" or reduced to approximately pre-war levels might be accompanied by reductions in the prices of commodities which are still far above the pre-war level."

FORM AUTOMOTIVE DIVISION UNDER THE DEPARTMENT OF COMMERCE

NEW YORK, Sept. 1—Formal announcement of the formation of the automotive division under the Department of Commerce and in the Bureau of Foreign and Domestic Bureau, as a part of the plan of Secretary Hoover to aid industry, was made here to-day by the National Automobile Chamber of Commerce. Gordan Lee will head the automotive division and William J. Irvine will be the automotive trade commissioner working with Lee.

Lee has had lengthy experience in the automotive industries. He was formerly in the sales department of the Ford Motor Co., working in the Fordson tractor division, in New York State. Later, he joined the firm of Gaston Williams & Wigmore and made a tour of the world with their automotive lines. Irvine was formerly with the White Co., being in the foreign sales promotion department.

Both these men are now at Washington and have begun their duties, their first work being to survey the field and determine the assistance that may be rendered the industry. Irvine probably will go abroad within a few months.

The formation of the division has been under consideration for some months and is similar to the trade divisions recently named by Secretary Hoover in other industries. It will concern itself with tractors, trucks, cars, motorcycles and equipment, in the promotion of both foreign and domestic business.

Durant to Organize Company in Canada

TORONTO, Aug. 31—Durant Motors of Canada, Ltd., is soon to be organized. The company will begin shortly to assemble the Durant four for Canadian distribution and eventually, according to W. C. Durant, will build here the entire car, even the electric system and tires.

Durant has purchased a former munition plant at Leaside near Toronto. There 2500 men will be employed and an assembly building will be erected for use right away and manufacturing on a considerable scale will be under way, Durant states, about March 1. Production of 100 cars a day is planned.

A Toronto man whose identity is not known will be associated with the American manufacturer.

ATLAS IS REDUCED

YORK, PA., Aug. 31—Effective Sept. 3, 1921, the list price of the Atlas "Merchant's Dispatch" is reduced to $1,550, f.o.b. York, Pa. This is the second cut in the price within a year and makes a total reduction of $215.

Rubber Exports on Gradual Increase

Great Britain Purchasing Larger Quantities—Mexico Also Shows Improvement

AKRON, Aug. 31—There has been a gradual improvement in exports of rubber goods although the improvement is spotty in character and while no figures are available as yet, the improvement has been noticeable.

Great Britain is purchasing larger quantities of rubber goods according to reports of the export departments of the larger factories. The Scandinavian countries have purchased larger amounts of rubber goods during the past two months than during the previous three. Business from the east coast of South America with the exception of some states in Brazil, is gradually improving.

Business through Mexico has shown some improvement recently. In Canada the rubber business, especially tires, has shown practically the same improvement which has been registered in the United States. The depression in the rubber industry came a few months later in the foreign fields than it did in the United States, but the slight business revival which has been noted abroad came about the same time business picked up generally in the rubber field in this country.

Columbus Has Annual Motor Show This Week

COLUMBUS, O., Aug. 30—The annual fall show, given under the auspices of the Columbus Automobile Show Co., opened at the Ohio State Fair Aug. 29 to continue for the week. The show opened under the best of conditions as some very good advertising had been done by the fair management and crowds were larger than usual. The automobile show occupied Automobile Building, which was 100 by 400 feet. Anson B. Coates was manager of the show.

Among the cars displayed were the Overland and Willys-Knight, Franklin, Hudson and Essex, Lincoln, Davis, Harry C. Stutz. Chevrolet. Sterns, Moon, Hupmobile, Cleveland, Chandler, Allen, Nash, Peerless, Maxwell, Chalmers, Buick, Studebaker, Columbia, Dodge, Oldsmobile. Pierce-Arrow, Reo, Stutz, Haynes, Cadillac, Packard, Oakland, Wescott, Auburn, Grant, Scripps-Booth, Ford, Jordan, Stephens, Lexington, Milburn electric and Roamer. A few trucks were also included in the exhibit.

BUS PLEA IS MADE

INDIANAPOLIS, Aug. 30—Investigation of efforts of city officials and street railway officials to prohibit jitney bus operations has been begun by the Citizen's Protective Association which demands that jitney buses be allowed to operate freely in order to insure the public with adequate transportation.

METAL MARKETS

ALTHOUGH stabilizing influences are multiplying, the steel market continues to present a surface appearance of price variations and fluctuations. Concessions are largely a matter of how advantageous to operating schedules the tonnage and specifications involved in individual orders may be. Some of the sheet mills have recovered to a point of operations where they can well afford to make some sacrifices in order to increase their output to a percentage of capacity that will bring the overhead down to a more normal level per ton of rolled product. To this rational motive rather than to any ambition to wage war upon competitors for the sake of weakening them must be ascribed such price inducements as buyers are able to obtain these days. It will be well for steel consumers not to delude themselves on this score. Daily newspaper reports in the last few weeks have made it appear as though the steel industry was more or less in the midst of a price war waged, as price wars usually are, by one side for the sole purpose of enfeebling the other. Nothing is further from the truth. Every producer's goal is to get enough orders on his books to bring more and more of his equipment and labor to a state of useful productivity and, succeeding in this, he doesn't waste any thought on his more or less fortunate competitors. When Judge Gary stated the other day that in the case of most mills selling prices represented very close to actual production costs, he did not intend to convey the impression that these producers were standing on the brink of becoming unfair competitors of the Corporation. He merely laid bare the plight in which the entire industry finds itself. If there is a steady increase in mill operations from now on, it will be a stabilizing factor of prime importance. In connection with agitation to bring about early downward revision in freight rates on steel and steel products, it is noted that many of the transportation interests support this movement. Apparently the Interstate Commerce Commission's attitude is the chief stumbling block which, executive traffic officials of the steel companies opine, it will be possible to overcome in good time. Such revision of freight rates would, of course, exert paramount stabilizing influence on steel prices and, now that labor rates have been adjusted all around, would tend to bring out considerable buying for future delivery, which is a sine qua non of genuine stabilization.

Pig Iron.—The market is turning more and more into a sellers' affair. Automotive foundries, however, are not figuring very prominently in the market at this time.

Steel.—A broadening demand for automobile sheets is noted, with the smaller rolling mills quoting 4.45c. for the base gage, a reduction of $5 a ton from the recent asking price. In some instances 4.35c. is said to have been the price named for No. 22 gage. In pre-war days 1.35c. was the customary spread between black and full finished sheets, but it is recognized that higher labor costs, etc., have made obsolete this spread, which, on the 2.75c. basis for black sheets, would make the price for full finished sheets 4.10c. No change is noted in the strip steel market.

Aluminum.—With some of the Continental ingots, 98 to 99 per cent pure, offered at as low as 19c., there are those who wonder whether the anti-dumping law may not be invoked if European producers continue to flood the American market with aluminum at prices jeopardizing continuity of American production. Consumers, however, contend that the salvation of the American aluminum industry lies in meeting these prices, at which automotive consumption would increase considerably.

Copper.—The market is decidedly easy, producers offering no opposition to the lower prices that have resulted, apparently because of a desire to stimulate further buying and reduction of accumulations.

Tin.—The market is quiet and prices continue low.

Lead.—Moderate steadiness characterizes the lead market.

Zinc.—Dulness continues to prevail. Consumers not buying.

INDUSTRIAL NOTES

Duplex Motor Truck Co., Lansing, is sending its experimental passenger bus on a tour of Ohio and Indiana, to demonstrate the possibilities of meeting transportation problems by bus operation. The Duplex bus has been in operation for two months in Lansing, demonstrating its adaptability for public transportation.

Mission Motor Co., Los Angeles, has been appointed Dort distributer for southern California. George Goodrum, president of the company, is a veteran Coast distributer and associated with him is F. A. Petrie, who was formerly assistant general sales manager for Dort at the factory.

Rubber Products Mfg. Corp., Kansas City, has been formed and chartered to operate the Kansas City Tire & Rubber Co., which for two years had been operated under lease by the A. J. Stephens Rubber Co., which will continue to distribute output.

Spicer Mfg. Co., Plainfield, N. J., reports August the best month in some time. John Lee, a company official, says business has been showing great strides.

Studebaker Corp. of America has moved its Detroit sales branch into the new headquarters at 3646 Woodward Avenue.

WISCONSIN FAIR OPENS

MILWAUKEE, WIS., Aug. 30—What is planned by the Milwaukee Automotive Dealers Association to be the most intensive selling effort it has ever undertaken is the annual State Fair motor show, which opened to-day with the seventy-fifth annual agricultural exposition at West Allis, suburb of Milwaukee. Not only is this year's show to be a merchandising campaign of a high order, but the occasion will be employed to give the public a new conception of the utility of the passenger as well as commercial car to the end that "pleasure" and "luxury" be abolished in popular descriptions of passenger cars. The ways and means for accomplishing this end will be unfolded as the show progresses. It will close with the fair on Saturday afternoon, Sept. 3.

LINCOLN LIGHT STARTS

MILWAUKEE, WIS., Aug. 18—The Lincoln Light Corp. of Milwaukee, which was organized several months ago, has commenced manufacturing operations in a new plant at Grafton, Ozaukee County, north of Milwaukee.

FINANCIAL NOTES

Fisher Body Co. for the three months ended July 31 reported a surplus after all charges, including Federal taxes, of $1,212,236. Allowing for dividends on the preferred stock, this was equal to $2.30 a share on the 500,000 shares of common stock of no par value outstanding. In the corresponding period of last year the company reported a surplus of $2,221,553, equivalent to $4.29 a share on the same amount of stock. Net earnings for the period ended July 31 amounted to $1,720,643. Interest payments called for $227,587 and reserves for Federal taxes amounted to $280,820, leaving the surplus of $1,212,236. In the same period of 1920 net earnings were $3,673,642, after deducting $283,299 for interest and setting aside $1,168,700 for tax reserves, leaving the surplus of $2,221,553. Net earnings were calculated after deducting all charges for repairs, maintenance and depreciation.

Motors Products Corp. directors have arranged to purchase for retirement 32,000 shares, or approximately 40 per cent of the company's capital stock outstanding, at a price not to exceed $50 a share, according to information obtained yesterday. Under the plan the stockholders are given the privilege of disposing of their pro-rata holdings as of the close of business Aug. 23, 1921, and the right to exercise the option to sell any or all of their pro-rata shares expires Sept. 6, 1921. The directors are authorized to buy from any available source the number of shares needed to retire the full amount mentioned under the plan, provided the stockholders do not consent to dispose of their pro-rata holdings. All stockholders who desire to dispose of more than their pro-rata share are authorized to notify the directors.

Raybestos Co. of Bridgeport, Conn., manufacturers of automobile brake linings, Ford accessories and automotive supplies, increased the capital stock from $3,000,000 to $8,000,000, it was disclosed by papers filed in the town clerk's office here. There is an increase of common stock shares from 15,000 to 30,000; of preferred stock shares from 15,000 to 50,000. None of the stock is on the market, it is announced. The increase of capital stock was to finance the purchase of the General Raybestos & Rubber Co. of Charleston, S. C. This is an older concern than the local one and operates spinning mills of Raybestos fabrics. The combination, it is stated, means a strengthening of both organizations. The Charleston concern will supply the local concern with most of its material.

Keystone Tire & Rubber Co. reports for the six months ended June 30, last, deficit from operations $247,018, and a deficit after interest, losses, taxes, etc., of $279,729. The balance sheet as of June 30, last, shows cash on hand and in banks, $48,935; accounts receivable, $2,193,339; bills receivable, $73,504; merchandise inventory, $565,287; accounts payable, $384,678; deficit, $591,936; total assets and liabilities, $3,876,423.

Martin-Parry Corp. board of directors has this day declared a quarterly dividend of 50c. a share on the capital stock of the corporation, payable Sept. 1, 1921, to stockholders of record at the close of business Aug. 15, 1921. The transfer books will not be closed.

Packard Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Sept. 15 to stock of record Sept. 1.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Aug. 30—In spite of business depression and widespread unemployment, the savings banks of New York State have gained nearly $250,000,000 in deposits in the year ending July 1, 1921, of which $93,000,000 came from interest credited on deposits, while $156,000,000 represented new deposits. The number of depositors increased by 83,000 in the same period. Total resources of New York State savings banks on July 1, 1921, were $2,856,110,000, a gain of over 10 per cent in the year.

The Federal Reserve system continues its improvement by remarkable strides from week to week. The ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 65.8 per cent on Aug. 17 to 66.5 per cent on Aug. 24, while the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against deposit liabilities, advanced from 86.3 per cent to 87.7 per cent. This improvement was accomplished by an increase of $19,000,000 in gold and $2,000,000 in other reserves, making the total reserves on Aug. 24 $2,766,000,000, and by a decline of $18,000,000 in note circulation, which was $2,486,000,000 on Aug. 24. Total deposits increased by $2,000,000 to $1,674,000,000, due to an increase of $12,000,000 in Government deposits, and a decrease of $10,000,000 equally divided between the member bank reserve account and all other deposit items. Note circulation since it reached its highest point of $3,405,000,000 last December has declined $920,000,000, or 27 per cent. Total bills on hand declined during the week by $23,000,000 to $1,530,000,000 on Aug. 24. Bills bought in the open market declined $6,000,000 and bills discounted secured on Government obligations declined $18,000,000, while commercial bills discounted increased $1,000,000.

Although the crop moving demands upon the money market are still increasing, money rates have fallen off slightly. Call money ranged from 5 per cent to 5½ per cent last week, compared with a range of 5½ to 6 per cent the previous week. On Friday last 5 per cent was the only rate quoted throughout the day, while loans were made outside the Stock Exchange at 4½ per cent. Time money also declined from a range of 6 per cent to 6¼ per cent to 5¾ per cent to 6 per cent for all maturities, but trading was comparatively dull. Prime commercial paper, on the other hand, for all maturities up to six months, was fairly active with the rate at 6 per cent. Demand came chiefly from country banks. Whatever the cause of the ease in money rates, statistics which show a total of $2,340,000,000 of new securities offered in seven months ending July 31, 1921, compared with $2,567,000,000 offered in the same period of 1920 and $2,184,000,000 in the first seven months of 1919 indicate that our investment market is absorbing new capital issues to the same extent as usual. However, few new issues were brought out in August.

Demand for Motor Cars Better in Charlotte

CHARLOTTE, N. C., Aug. 30—The motor car demand in this section is improving. Coddington's special train has just made another trip from the Buick factory, bringing this time 201 automobiles of different types, and other distributors are also bringing them in about as fast as they can get them. The Anderson Motor Co. of Rock Hill reports an improvement in business, their dealers now placing good sized orders for their product. Charles R. Shanks, vice-president of the company, is of the opinion that recent favorable action by the Federal Reserve Board toward relieving the cotton situation in the South is one of the principal factors in bringing about this improved condition. Another factor, says Mr. Shanks, is the realization on the part of car buyers that the limit of low price levels has been reached and that in all probability the next change in price will be upward.

The Anderson plant at Rock Hill, which had been operating on half time during recent weeks, is now going ahead on full time. The company has recently made improvements in its cars and added two new models and these are contributing factors to the plant's activity.

Indian Refining Wars on Standard Oil Prices

INDIANAPOLIS, Aug. 30—A fight is being waged between the Indian Refining Co. and the Standard Oil Co. here. The Indian Refining Co. equipped with a battery of twelve new Packard trucks has announced through their officers that two cents a gallon is a sufficient margin of profit for filling stations and garagemen who sell gasoline. The price has been cut and further declines are promised since officials of the company have arrived from New York. Officials of the Standard Oil Co. declare that they do not wish to enter into any controversy with the Indian Refining Co. or any other company, but at the same time every cut in price on the part of the Indian Refining Co. will be met by the Standard Oil.

Kelsey Wheel Official Dies After Long Illness

DETROIT, Aug. 31—James S. Stevenson, vice-president of the Kelsey Wheel Co., died here Tuesday after a two years illness. He had been a resident of Detroit since 1887, joining Berry Bros, Inc., and later becoming general manager of that company.

Stevenson was probably as well known here as the biggest men in the automotive industry.

MEN OF THE INDUSTRY

George Sprowls, of the factory manager's staff of the Goodyear Tire & Rubber Co. of Akron, has sailed for an extensive survey of economic and export trade conditions in Europe. He will spend a year investigating foreign trade conditions with reference to the tire and the automotive industries. Sprowls will be in Berlin on Sept. 23, for the first German automobile show held since the war. He will also attend the Paris automobile show in October, and the English automobile exhibit at London in November. His business survey will include France, Spain, Germany, Holland, Belgium, Switzerland, Norway, Sweden and Denmark.

H. R. Hoskin, manager of the accounting department of the Goodyear Tire & Rubber Co., has been named assistant comptroller of the company. The comptroller's office was established when E. G. Wilmer succeeded F. A. Seiberling as president under the new Goodyear financial control, and takes the place of the old Goodyear board of control. **A. J. Blanchet** also has been named assistant comptroller. P. E. H. Leroy, manager of the foreign finance department, has been named assistant treasurer.

Ralph L. Ross, for two years general superintendent of the Moreland Truck Co. of Los Angeles and formerly connected with the Continental Motor Corp. at Detroit and Muskegon and superintendent of the Beaver State Motor Co. of Portland, Ore., now has become connected with the Leach-Biltwell Motor Car Co. of Los Angeles. Ross has assumed charge of the motor department, production end, of the Leach factory.

Chas. A. Nevins, consulting engineer of New York, has joined the organization of the Cameron Motors Co., New York, and will be general manager and chief engineer of their recently acquired plant at Greenville, Mich. Nevins has been associated with the automotive industry for a number of years, both in the United States and Canada.

Morris H. Anderson has assumed charge of the Detroit branch of Mack International Motor Truck Corp., succeeding W. W. Heite, transferred to the head office in New York. Anderson was formerly assistant manager of the central territorial division for Mack, with headquarters in Chicago. Before that he was with Packard.

H. B. Phipps, export manager for the Hudson-Essex Motor Car Co. for the past eight years, has been appointed sales manager by O. H. McCormack, general sales manager. Irving Segwalt has been appointed assistant sales manager in charge of car distribution, and C. V. Williams, export manager.

Charles M. Steele, who was reported in last week's Automotive Industries to be the new advertising manager for Studebaker is and has been for some time manager of the bond department of the banking firm of Dominick and Dominick, New York.

H. S. Durant, of the American Steel & Wire Co., Chicago, has been appointed sales agent and M. W. Floto, assistant sales agent at the Detroit office, to succeed M. Whaling and T. J. Usher, Jr., resigned.

Roy F. Irvin has been made sales manager of the Steel Wheel division newly organized by the Motor Wheel Corp. He will also continue his duties as advertising director.

J. Paul Winchell has been added to the research staff of the Duplex Truck Co., Lansing, Mich.

Calendar

SHOWS

Sept. 5-10—Indianapolis, Automobile and Accessory Show in conjunction with Indiana State Fair conducted by Indianapolis Automobile Trade Association, John B. Orman, Mgr.

Sept. 28 - Oct. 8 — New York, Electrical Exposition, 71st Regt. Armory. Electric Equipment, Machinery and Vehicles.

Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association. Fourth Regiment Armory.

Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.

January — Chicago, Automobile Salon, Hotel Drake.

Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Auspices of N.A.C.C.

Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.

Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

Sept. 9 to 17—Ottawa, Ont., Can.—Ottawa Motor Show.

Feb. 6 to 11 — Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.

FOREIGN SHOWS

September—Buenos Aires, Argentina, Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg. Agricultural Sample Exhibition.

Sept. 5, 1921 — Constantinople, Traction trials under the direction of the Turkish Ministry of Agriculture.

Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12 — London, British Motor Show, Society Motor Mfrs. and Traders.

November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees. Held by the Chambre Syndicale des Industries Aeronautiques.

March, 1922 — Santiago, Chili, Annual Automobile Show.

May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador. Automotive Section.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile exhibits in connection with the Brazilian Centenary Associcao Automobilista Brazileria.

CONVENTIONS

Sept. 14-15-16—Detroit, Credit Convention Motor and Accessory Manufacturers Association.

Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

Nov. 22—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.

Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.

RACES

Labor Day — Uniontown, Pa., Autumn Classic.

Indianapolis to Have Two Fall Motor Shows

INDIANAPOLIS, IND., Sept. 5 — Indianapolis is to be treated to two automobile shows this fall. The first, plans for which have been under way for weeks, will be that staged by the Indianapolis Automobile Trade Assn. this week. The second will be held in conjunction with the Industrial Exposition, which is to be held the week of Oct. 10. The two shows are similar in that automobiles and accessories will be shown, but they differ in that the latter exposition will be open only to Indianapolis-made products. Requisitions for space already have been received from the automobile manufacturers here and from the tire and accessory manufacturers.

The automobile manufacturers will show in a group, space having been taken out sufficiently large to permit them all to make displays. The same thing is true of the tire and accessory manufacturers. Walter C. Marmon, head of the Nordyke-Marmon Co., and Harry C. Stutz of the H. C. S. Motor Car Co., both are on special committees making preparations for the event. The exposition is being staged under the auspices of the manufacturers' committee of the Indianapolis Chamber of Commerce, and the automotive industry is well represented on this committee. On this committee are George M. Dickson of the National Motor Car Co., D. McCall White of the Lafayette Motors Co., Paul P. Parker of the Parker Tire & Rubber Co., Harry C. Stutz of the H. C. S. Motor Car Co., L. M. Rankin of the Duesenberg Motors Co., Warren D. Oakes of the Oakes Co., John C. Orman, manager of the Indianapolis Automobile Trade Assn., and J. A. Daugherty of the Robbins Body Corp.

RUSH WORK ON PLANT

MUNCIE, Aug. 30—Preparations for resuming operations at the Sheridan Motor Co., former General Motors Corp. plant, now owned by the Durant Motor Co., are being rapidly pushed forward. It is the intention to make a new six cylinder car of practically the same specifications as the Sheridan, which name may be retained.

TO OPEN NEW METAL FOUNDRY

MILWAUKEE, WIS., Aug. 30—The American Metal Products Co., manufacturer of Ampco bronze and brass castings, bearing metals, etc., expects to start the operation of its new $100,000 foundry and machine shop within a week to ten days' time. The building is of brick and steel, 60 x 120 ft., with a separate office and transformer house, pattern shop, storage buildings, etc. A Detroit electric melting furnace of 1000 lbs. capacity has been purchased from the Detroit Electric Furnace Co. With the new plant and equipment the company expects to enter the general brass and bronze casting field on a tonnage basis, continuing to make special bearing metals and similar specialties for the gas engine, machinery and automotive industries generally. Carl J. Zaiser is secretary-treasurer and general manager of the company.

TO MAKE NEW BEARING METAL

BLOOMINGTON, ILL., Aug. 30—The John M. Ryan Foundry Co. of Rock Island, Ill., has secured the exclusive motor vehicle rights for the manufacture of a new lead and copper bearing alloy invented by A. H. Ackerman of Chicago. A closer amalgamation than has been obtainable heretofore and greater uniformity are claimed for the new alloy. The physical properties are given as follows: Tensile strength, 19,600 lbs.; elastic limit, 14,700 lbs. A new company is to be formed and new buildings are to be erected for the production of the alloy, and it is also planned to license other bearing companies to use the metal. One of the advantages claimed for the new bearing metal is that as compared with brass backed babbitt bearings, bearings made of it cost only half as much to produce.

Demand Increases Around Cleveland

CLEVELAND, Aug. 30—Cleveland automobile manufacturers have experienced an increased demand for their products since Aug. 15. This, coupled with business already on hand for the month, assures a healthy condition of production for September. October is looked forward to with optimism by the average auto maker here.

The average manufacturer experienced a slight let-up in the demand during the latter half of July. This slowdown continued through the first two weeks of August. But things have picked up considerably. The condition is considered especially good in view of the fact August is a vacation month when the family stocks up for the outing, and car buying ordinarily slows down greatly.

At the plant of the Jordan Motor Co., for instance, dealers reported sales of 150 new cars per week the first two weeks of July. That is at the rate of 600 cars a month. In the last two weeks of July sales dropped to 125 cars a week. In the third week of August sales were 135 cars. During this period the dealers were selling approximately 75 to 100 used cars a week. This is a barometer that correctly records what is taking place in this city.

At the plant of the Stearns Co., G. W. Booker, the sales manager, said his concern had experienced a trade increase since Aug. 15. The factory is running at 90 per cent of normal. The company has booked many orders for the new five-passenger, two-door brougham coupé that is to be put on the market Sept. 1.

Another barometer of conditions is the report of the McGraw Tire & Rubber Co. for July. Net earnings for the month totaled $35,000, compared to $20,000 in June. The company is making 2000 tires a day and 300 tubes. It was said sales are running 4000 tires daily. On this schedule the inventory is being reduced rapidly.